General Specifications

FAST/TOOLS

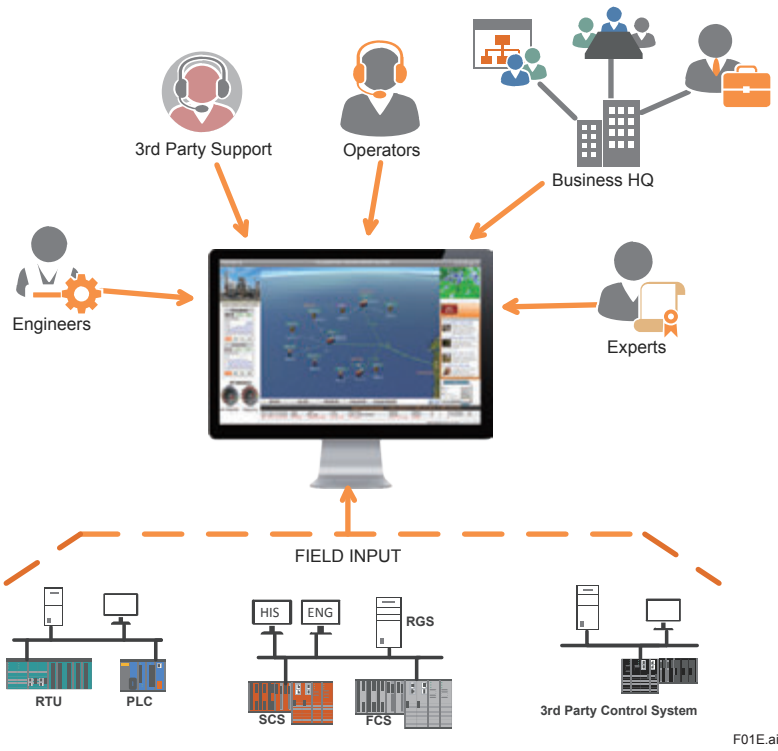
GS 50A01A10-01EN

■ GENERAL

FAST/TOOLS has been developed with over 35 years of experience by combining our expertise in Supervisory Control And Data Acquisition (SCADA) with requirements from users and industry leaders. The FAST/TOOLS package is a powerful, modern, flexible, distributed operations information and control software package. It implements a Web-based supervisory control human machine interface, OPC server/client functions, data acquisition from a variety of controllers and devices, alarm management and historical data management. Furthermore it is a leading system package for operations control and information integration with business systems and is available on a wide range of industry standard operating platforms. Many industries and utility companies with a need for data integration and data integrity use FAST/TOOLS from Yokogawa in their applications. FAST/TOOLS is also successful in critical applications due to its very reliable design, support of redundant and nonstop systems and its on-line configuration capabilities. These properties contribute to high efficiency and high quality production processes. FAST/TOOLS has been developed with a number of key issues in mind, one of which is to provide a system that can start small and which can easily grow with client needs, both in the short and long term. This philosophy protects against premature obsolescence. The consequence of being a hardware independent supplier means support of standard operating systems, standard network protocols, standard user interfaces and standard software development tools. FAST/TOOLS provides solution possibilities in a wide range of control execution applications with the following characteristics:

- Multiple Process Site environments
- PLC/RTU based control systems
- Wide area communication
- Intensive (mission critical) control performed by subsystems
- Relatively high content sequential (logic) control

These characteristics are often seen in for example Oil & Gas production and transport, infrastructure, utilities monitoring and control and high performance manufacturing applications. It also allows the flexibility of combining different types of systems to provide hybrid solutions, both on new and existing sites (green and brown field development).



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FAST/TOOLS has a truly User Environment. All the workflow processes, business logic, and database links were designed after careful studies both technical and ergonomically. It's built to work autonomously in a web-based user enviroment and can be extended with new applications. Web-based applications can easily access legacy data on other platforms. Typically interactive, the application accepts input from the web user, processes the input, and displays the results. Information is stored on BuildLinks' servers and the access is obtained via secure logins.

Applications and process information can be rapidly deployed and is easily maintained centrally on the server. This so called "zero deployment" means that client applications can be run from any web-browser and the users always get the most recent version of an application. There is no need to manage licenses and software installations on the client side and no application files need to be copied over and no communication configurations need to be setup. Benefits include faster application deliverys increased IT productivity, and widely accepted technology.

Other benefits of a user environment are:

- Information can be accessed anywhere an Internet connection is available.
- The information is 'real-time' (no waiting time for critical information).
- The information is more secure than it would be on a personal computer.
- Upgrades containing new functions and enhancements are free and automatically deployed there is no need to manually install software or license keys.

Today Web-technologies are used more and more. Instead of specific client programs, Web browser environments become a user interface, a HMI, to an application (see figure below).

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Figure Web Based Visualization

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The FAST/TOOLS Web HMI consists of a Web HMI Server and a Web HMI Client component that can either run separate from the FAST/TOOLS Server or be installed altogether with the FAST/TOOLS Server environment on a standalone node. Installing the Web HMI Server on a separate node has the advantage that load can be shared between the FAST/TOOLS Server and Web HMI Server.

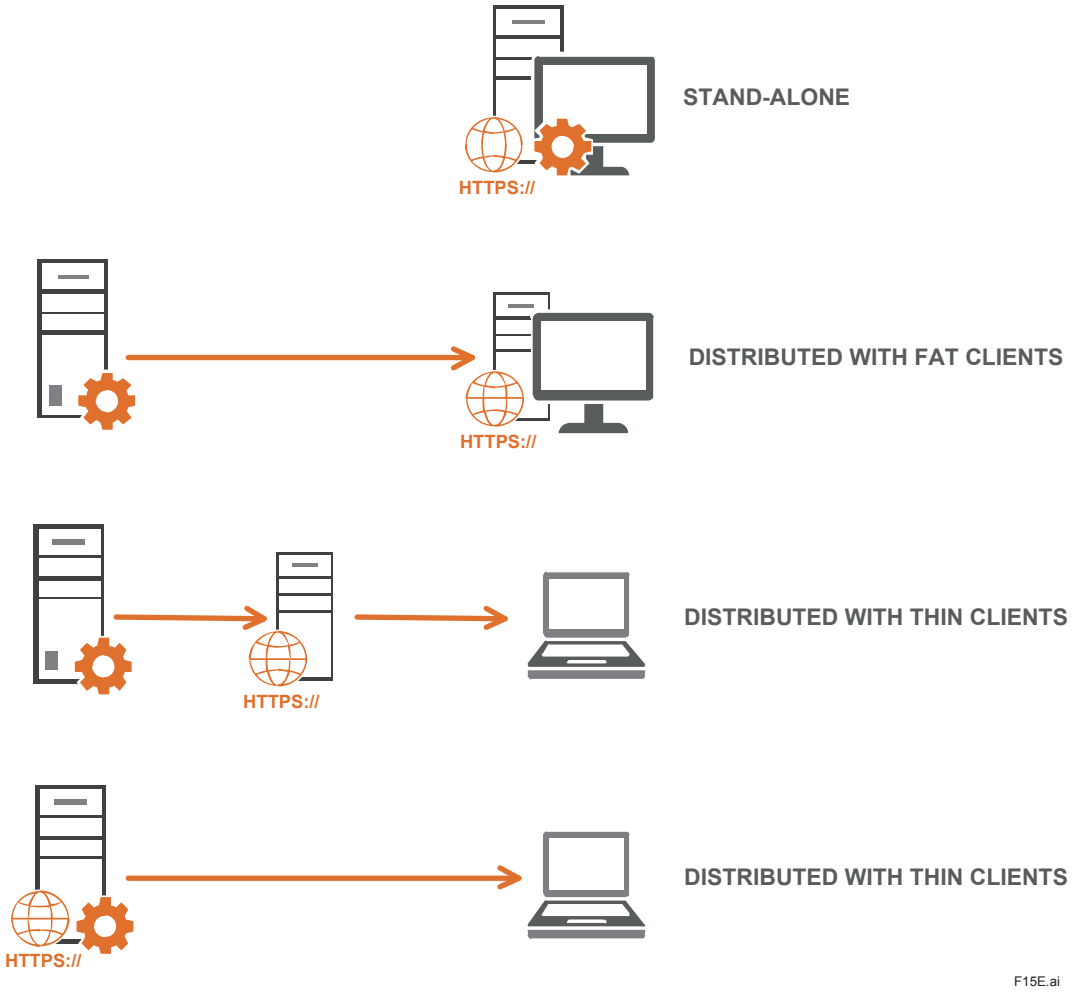

Figure System Software Distributions

For 24/7 operator stations, both web HMI server and client are advised to be installed and maintained on the same machine as represented in the centre of the figure above.

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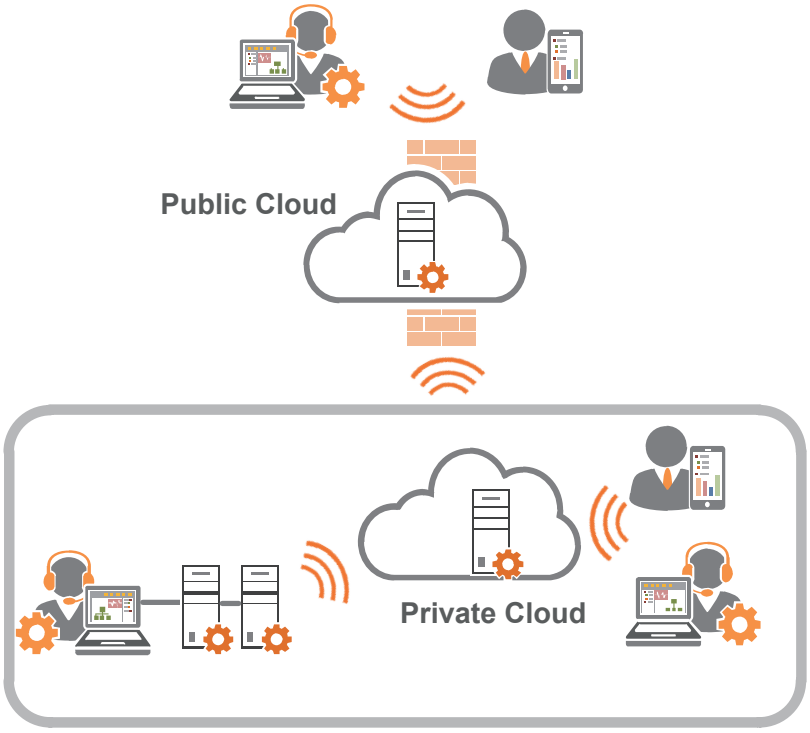

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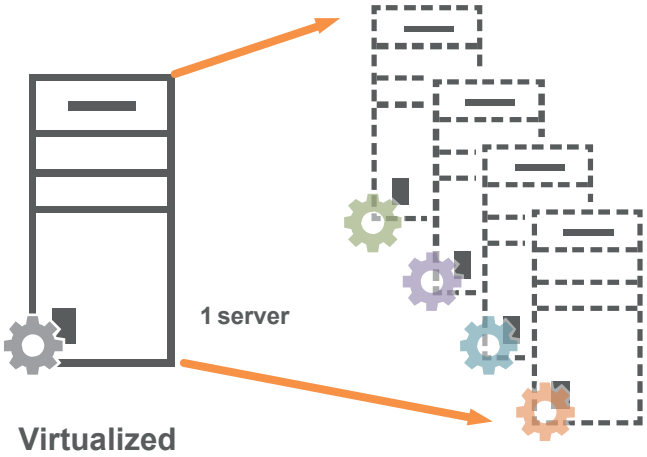

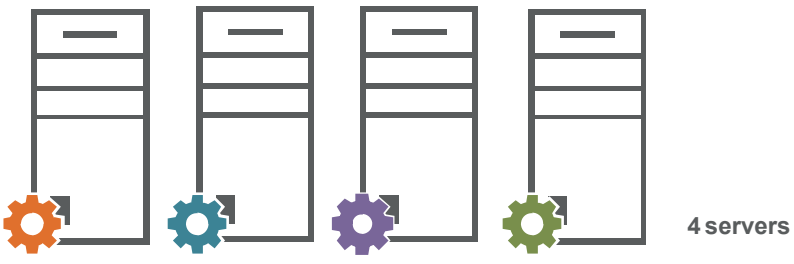

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Beyond traditional system software distributions, cloud computing & virtualization infrastructures are fully supported by the FAST/TOOLS software platform.

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■ SYSTEM SPECIFICATION

● FAST/TOOLS Software Modules

FAST/TOOLS is comprised of function specific software modules (specified in the table below) that connect to the communication data bus BUS/FAST. All FAST/TOOLS modules are event based and submit their events to BUS/FAST. BUS/FAST passes these events in a highly secure and reliable manner to modules that are subscribed to these events. The result is a very low CPU-load on any system during normal operations.

Tool name	Description
BUS/FAST	Basic networking support and secure communications
DATABASE/FAST	Real-time database with ISAM based file support and distributed Data Set Services
HISTORY/FAST	History scheduler
AUDIT/FAST	Audit trailing and Operator Log
ITEM/FAST	Real time item data handling
EQUIPMENT/FAST	I/O communication
ALARM/FAST	Alarm management and handling
PROCESS/FAST	Sequencing and Calculations
REPORT/FAST	Report generation
ACCESS/FAST	Open DataBase Connectivity (ODBC) interface, OPC (DA&AE) server and client functionality
USER/FAST	Configuration & Presentation
INTEGRATION	Various utilities and application integration options.

The full FAST/TOOLS functionality can be installed on one system (stand-alone configuration) or distributed over many (dispersed) systems (distributed configuration). The minimal configuration of any FAST/TOOLS system is a standalone system with the following modules installed:

- BUS/FAST
- ITEM/FAST
- DATABASE/FAST
- EQUIPMENT/FAST
- ALARM/FAST
- PROCESS/FAST
- USER/FAST

Additionally any of the other modules can connect to the bus in order to enhance the functionality of FAST/TOOLS.

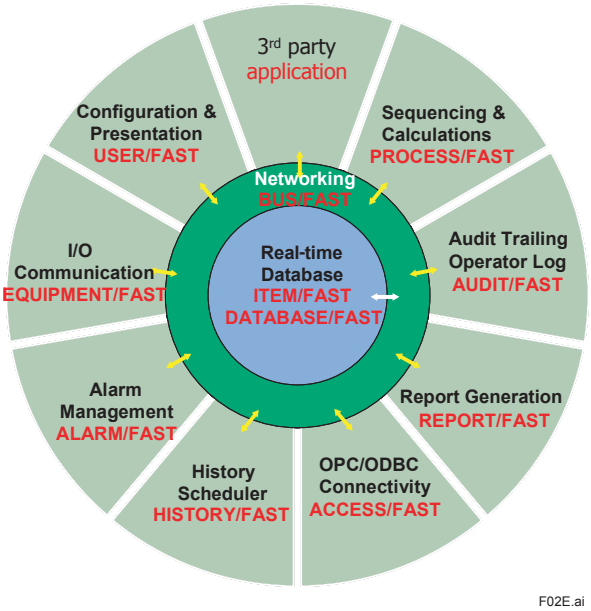

Figure FAST/TOOLS Modular Structure

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● FAST/TOOLS Functional Components

In addition to the software modules FAST/TOOLS defines four functional components within its software & system architecture which may be distributed across geographical dispersed locations to adapt to any specific application requirements:

Function	Description
SCADA Server	The SCADA Server is the core processing unit of the system. Within a distributed configuration it manages sets of data such as control objects (tags) and takes care of gathering data from the attached equipment and front-end servers in any distributed or stand-alone configuration.
Front-End Server	A Front-End Server takes care of intensive pre-processing of large data quantities from the attached equipment and passing it on to the SCADA server. In addition also some local control and operations functionality can be implemented.
Web HMI Server	A Web HMI Server delivers an operation and monitoring window (HMI) of data & information gathered and processed by SCADA servers to Web HMI Clients.
Web HMI Client	A Web HMI Client accesses a Web HMI Server to display process mimics, trends, alarm & events and other operating data. Furthermore each Web HMI client accommodates a full functional application engineering environment for both database and display configuration. A Web HMI Clients can run on the same computer as its Web HMI Server or on a different computer across LAN/WAN networks.

Each FAST/TOOLS system comprises at least of one SCADA Server, one Web HMI Server and one Web HMI Client component. These may be configured as a stand-alone or distributed system. The following table provides an overview of which of the specific FAST/TOOLS software modules are installed on each functional system component:

Module name	Component			
	SCADA Server	Front-End Server	Web HMI Server	Web HMI Client (Note)
BUS/FAST	*	*	*	
DATABASE/FAST	*	*	*	
HISTORY/FAST	*	*		
AUDIT/FAST	*			
ITEM/FAST	*	*		
EQUIPMENT/FAST	*	*		
ALARM/FAST	*	*		
PROCESS/FAST	*	*		
REPORT/FAST	*			
ACCESS/FAST	*	*(OPC only)		
USER/FAST			*	
INTEGRATION	*	*	*	

Note: The Web HMI Client only requires a standard supported OS (See System Requirements) and a Web browser (See System Requirements). There is no need to install and maintain any FAST/TOOLS components (zero deployment) on a Web HMI Client.

● FAST/TOOLS System Dimensions

The table below shows the scalability and specifies the dimensional limits of FAST/TOOLS based systems.

Function	Specification	Remarks
SCADA Server	Up to 4095 Servers per control LAN (Note)	Consult Yokogawa when more SCADA servers are needed. (Note)
Front-End Server	Up to 4095 Front-End Servers per SCADA Server (Note)	Maximum number of Front-End Servers one SCADA server can host. (Note)
Web HMI Server	Up to 4095 Web HMI Servers per SCADA Server (Note)	Maximum number of Web HMI Servers that can access to one SCADA Server. (Note)
Web HMI Clients	Up to 100 Web HMI Clients per Web HMI Server	Maximum number of Web HMI Clients that may connect at the same time to one Web HMI Server, including the Web HMI client on the same computer
Domain	Up to 4095 nodes per domain	A domain is defined as a SCADA Server and its associated Front-End Servers, Web HMI Servers and Web HMI Clients. Only the SCADA Server, Front-End Servers and Web HMI Servers are counted as a node. Up to 4095 devices per EQP and up to 1000 EQP's per server.
I/O devices and controllers	Up to 10000 per Server / Front-End	
Item tags	Up to 16 million per domain	

Note: The total number of nodes (= computer stations) in one domain may not exceed 4095 (computer stations with only a Web HMI Client installed are not counted as a Node). One should always consider the physical boundaries (network bandwidth, disk speed and storage capacity) that can affect these numbers.

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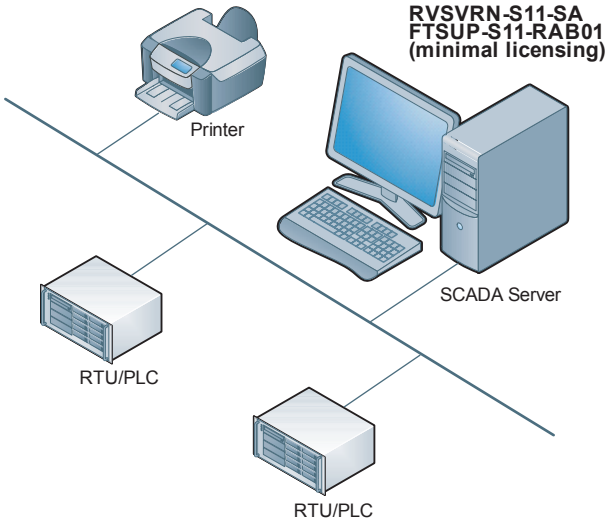
■ SYSTEM CONFIGURATIONS AND ARCHITECTURES

FAST/TOOLS has a true client/server architecture, which is not limited to stand-alone stations, and allows for distributed functionality. Front-end Servers give the possibility to reduce the load on the SCADA Server by pre-processing data on remote locations and passing through only relevant data. Configuration of these stations is stored on the SCADA Server and is automatically deployed to the Front-end Servers. There is no need for the engineer to visit the remote locations. SCADA and Front-end Servers can run one or more I/O-drivers per node, e.g. a configuration could be an application running up to 70 I/O-drivers at the same time on one node, using for example only three network connections available to connect to the 70 remote PLC/RTU devices.

Where system availability is a prime issue FAST/TOOLS can be configured to run in a redundant configuration. Several redundancy concepts are available as a standard, illustrating the flexibility of FAST/TOOLS. Examples are dual or triple server configurations, redundant networks between the SCADA system servers and clients and/or between SCADA system servers and PLC's, RTU's, etc. With the exception that Front-end servers can only be configured as a single server entry.

FAST/TOOLS supports at least any combination of the following architectures within the specified system dimension limits (see the SYSTEM SPECIFICATION section above).

● Stand-alone Concept



The 'Stand-alone' concept is based on running the complete SCADA data acquisition, supervisory control, engineering and operations environment on one computer. In terms of licensing this requires only one Windows based SCADA Server package (sized to the required number of items for its application). With reference to the 'Models and Suffix codes' section in this GS document the minimal license requirement for this architecture – assuming only the standard driver package for field I/O communications is required – is:

Item	Model	Quantity
SCADA Server	RVSVRN-S11-SA	1
Product support	FTSUP-S11-RAB01	1

This type of configuration may be used for relatively small applications where it is acceptable to have only one combined Server/HMI station for both operator supervision and engineering.

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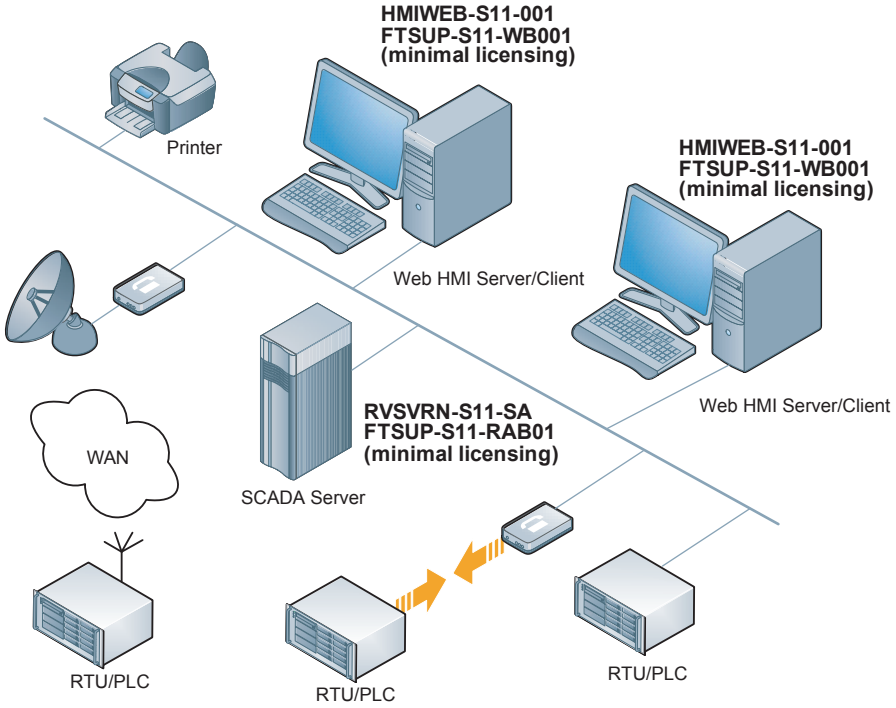
● Remote Web HMI Server/Client Concept



The 'Remote Web HMI Server/Client' concept allows for more scalability. It is based on running the SCADA data acquisition, applications and real-time database environment on a dedicated heavy duty SCADA server while running the engineering and operations environment on one or more dedicated operator/engineering computers. In terms of licensing the configuration as visualized above requires one Windows, Unix or Linux based SCADA Server package (sized to the required number of items for its application) and two Web HMI Server packages (including one client). With reference to the 'Models and Suffix codes' section in this GS document the minimal license requirement for this architecture – assuming only the standard driver package for field I/O communications is required – is:

Item	Model	Quantity
SCADA Server	RVSVRN-S11-SA or UNSVRN-S11-SA	1
Web HMI Server/Client	HMIWEB-S11-001	2
Product support	FTSUP-S11-RAB01 or FTSUP-S11-MAB01	1
Product support	FTSUP-S11-WB001	2

This type of configuration may be used for fairly large applications with many RTU/PLC stations randomly located (possibly at long distances) around one central location.

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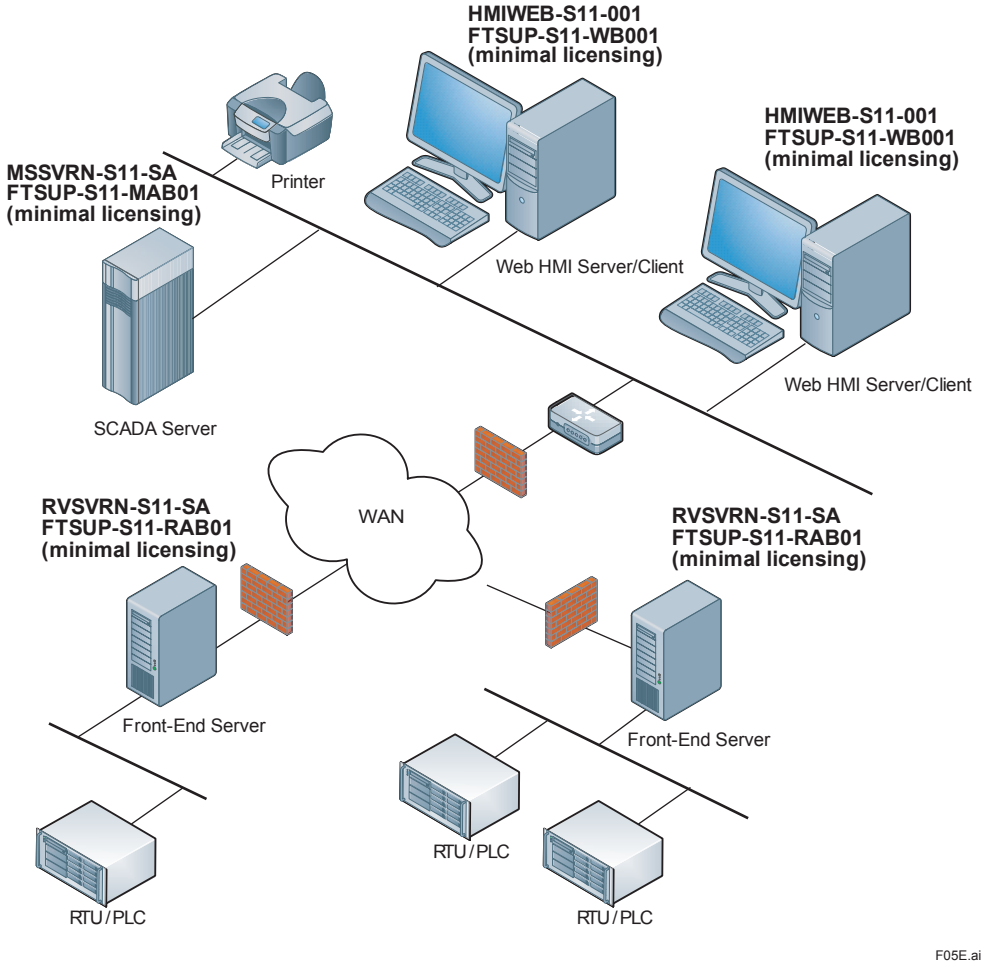
● Distributed System Concept



The 'Distributed system' concept allows for enhanced distributed environments. It is based on distributing the real-time database by running the primary SCADA data acquisition and pre-processing services on one or more Front-end servers hosted by a SCADA server while running the engineering and operations environment on one or more operator/engineering computers. In terms of licensing the configuration as visualized above requires one Distributed Windows, Unix or Linux based SCADA Server package (sized to the required number of items for its application) and two Web HMI Server packages (including one client). With reference to the 'Models and Suffix codes' section in this GS document the minimal license requirement for this architecture – assuming only the standard driver package for field I/O communications is required – is:

Item	Model	Quantity
SCADA Server	MSSVRN-S11-SA or UNSVRN-S11-SA	1
Web HMI Server/Client	HMIWEB-S11-001	2
Product support	FTSUP-S11-MAB01	1
Product support	FTSUP-S11-WB001	2
Front-end Server	RVSVRN-S11-SA	2
Product support	FTSUP-S11-RAB01	2

This type of configuration may be used in general for very large applications with very high concentration of data acquisition at several remote locations possibly with many RTU/PLC stations at each location.

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● Remote Web HMI Client Concept

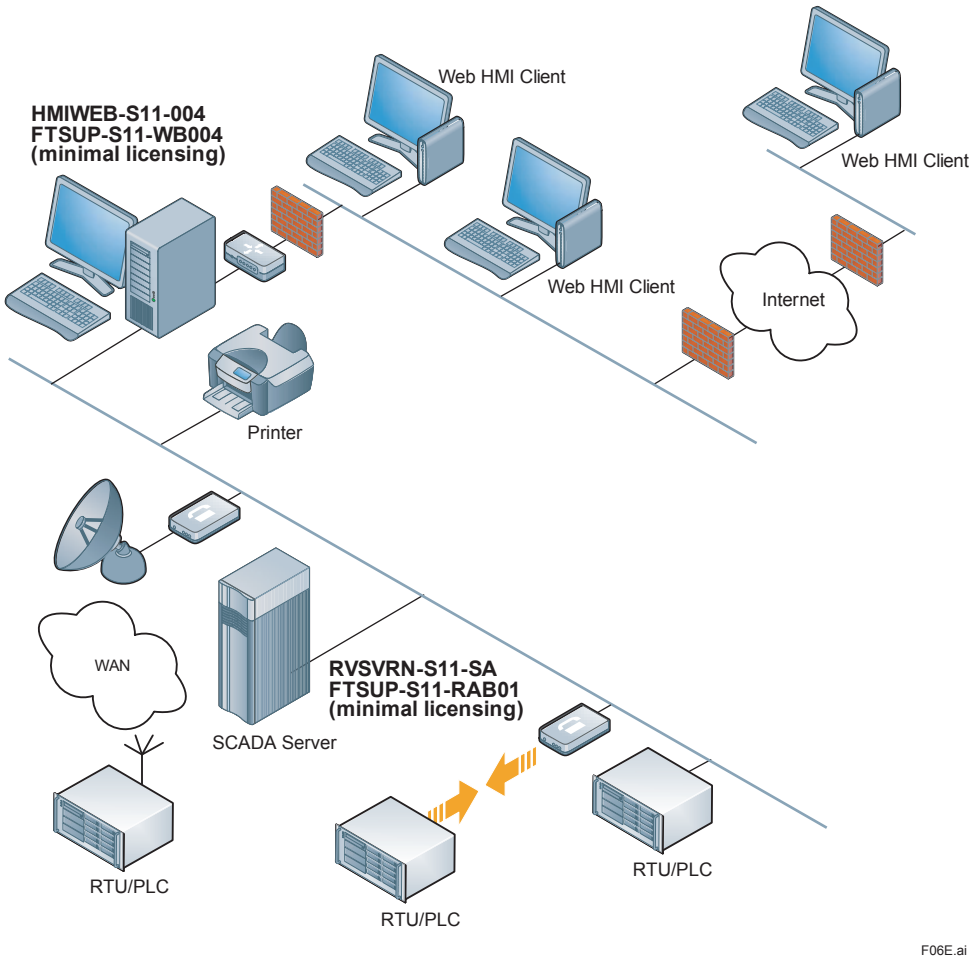

Figure Remote Web HMI Client

The 'Remote Web HMI Client' concept allows for enhanced HMI flexibility and negligible cost for maintaining remote clients across geographically dispersed locations. It is based on running the Web HMI Server on a dedicated computer serving its associated remote Web HMI Clients. These Web HMI Clients can be easily deployed on any computer device at any location over LAN, WAN and VPN networks. Local software installation and license registration is not required (zero deployment), and is initiated through a standard supported Web browser (Internet Explorer 8 or Firefox 3). In terms of licensing the configuration as visualized above requires one Windows, Unix or Linux based SCADA Server package (sized to the required number of items for its application) and one Web HMI Server package (including three client). With reference to the 'Models and Suffix codes' section in this GS document the minimal license requirement for this architecture – assuming only the standard driver package for field I/O communications is required – is:

Item	Model	Quantity
SCADA Server	RVSVRN-S11-SA or MSSVRN-S11-SA or UNSVRN-S11-SA	1
Web HMI Server/Client	HMIWEB-S11-004	1
Product support	FTSUP-S11-RAB0 or FTSUP-S11-MAB01	1
Product support	FTSUP-S11-WB004	1

This type of configuration may be used for applications when many 'light' and/or remote users need a real-time window into the process and its SCADA environment.

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● Host- to Host Architecture

The FAST/TOOLS Web HMI consists of a Web HMI Server and a Web HMI Client that can either run separate from the FAST/TOOLS Server or be installed altogether with the FAST/TOOLS Server environment on a standalone node. Installing the Web HMI Server on a separate node has the advantage that load can be shared between the FAST/TOOLS Server and Web HMI Server.

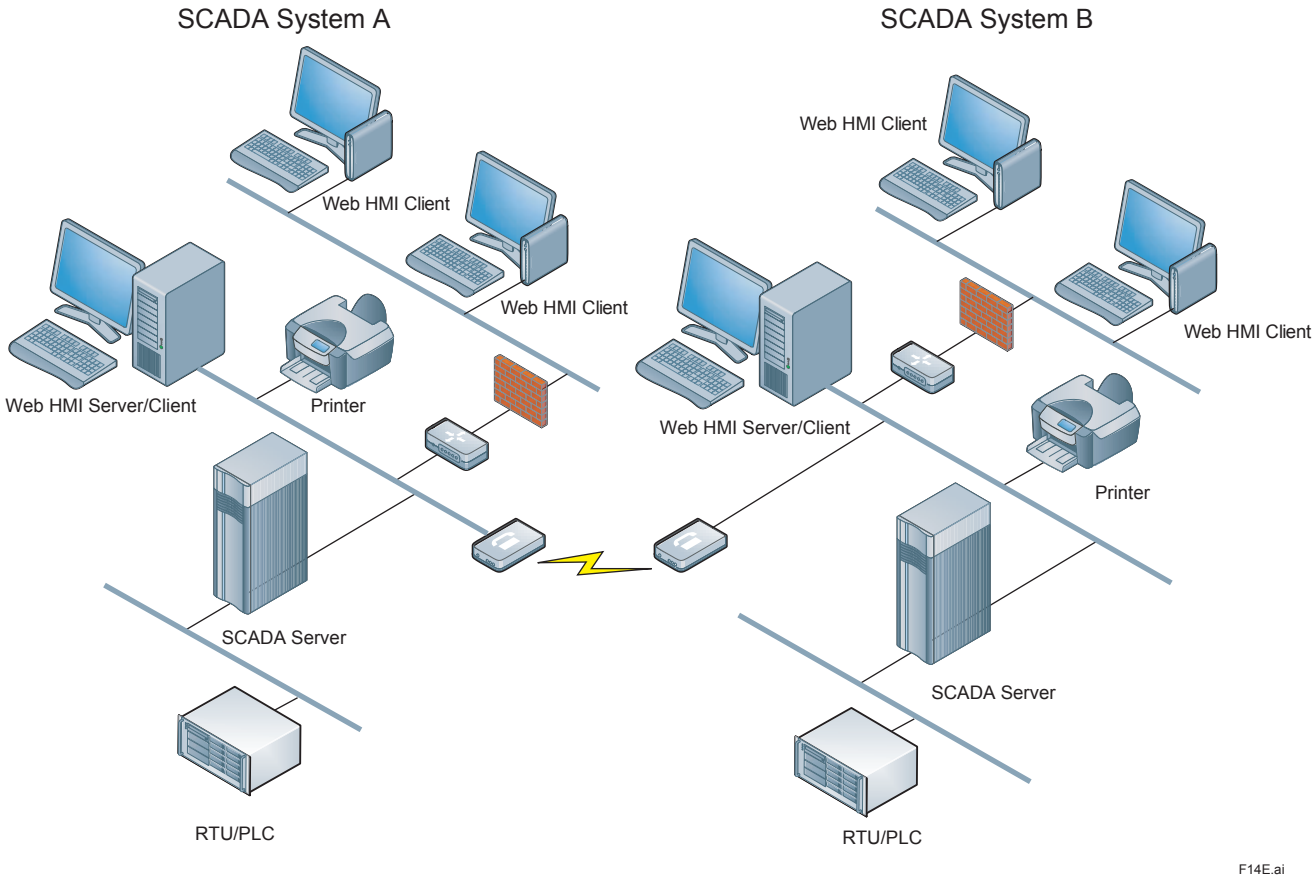

Figure Host to Host coupling

The ‘Host to Host’ concept (see figure above) allows for loosely coupling two or more autonomous FAST/TOOLS systems to exchange or synchronize ‘real-time’ data across independent system domains.

This type of configuration may be used for applications where several systems at a central or across dispersed process locations need to be fully independent in terms of maintainability and operations, while at the same time exchange key data with other (high level master) FAST/TOOLS SCADA Servers.

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Enterprise Architecture

For large scale geographically dispersed projects, there may be a hierarchy of individual Process Automation Systems, which in turn are each responsible for a specific region, and are managed by a higher level system. For these applications FAST/TOOLS provides a flexible, scalable architecture for Enterprise Automation Solutions, by supporting multi-level/multi-node configurations. It is possible to balance server functions over multiple machines, for example for data acquisition or for supporting many HMI clients. This architecture lends itself very well to Enterprise wide remote operations, - monitoring and - maintenance projects for dispersed production sites and supply chain infrastructures such as oil and gas fields, pipeline grids, water distribution, energy generation, etc.

In ISA-95, the functional levels of an Enterprise Control system are defined. Note that the levels presented in the sample architecture on the next page relate to a physical business model in which a company consists of a headquarters, regional offices and local offices. All these locations can contain systems which together form the Enterprise Architecture. This should not be confused with the automation levels defined in ISA-95, in which the logical information layers of a control system are defined. In the Enterprise Architecture, four major levels are identified (see sample architecture on the next page). Each level has its typical characteristics and usage.

Process level
The process level contains local DCS/SCADA/PLC systems or other automation control/monitoring equipment that directly interacts with the process. As an example a typical large gas production platform that is controlled by a DCS system and exchanging process information with the area level.

Area level
The area level supervises all processes within a graphical area to provide control over this area. It contains a FAST/TOOLS server node that is connected to all DCS and/or SCADA systems at the process level. A typical application at this level is to control the total amount of production within the area, and to supply production KPI's.

Business unit level
The business unit level is typically responsible for all areas within the business unit. The business unit contains a FAST/TOOLS server node that exchanges KPI's and other process data with the Area level. At the business unit level, users are expected to have access to data that is supportive in optimizing production of individual as well as interrelated assets.

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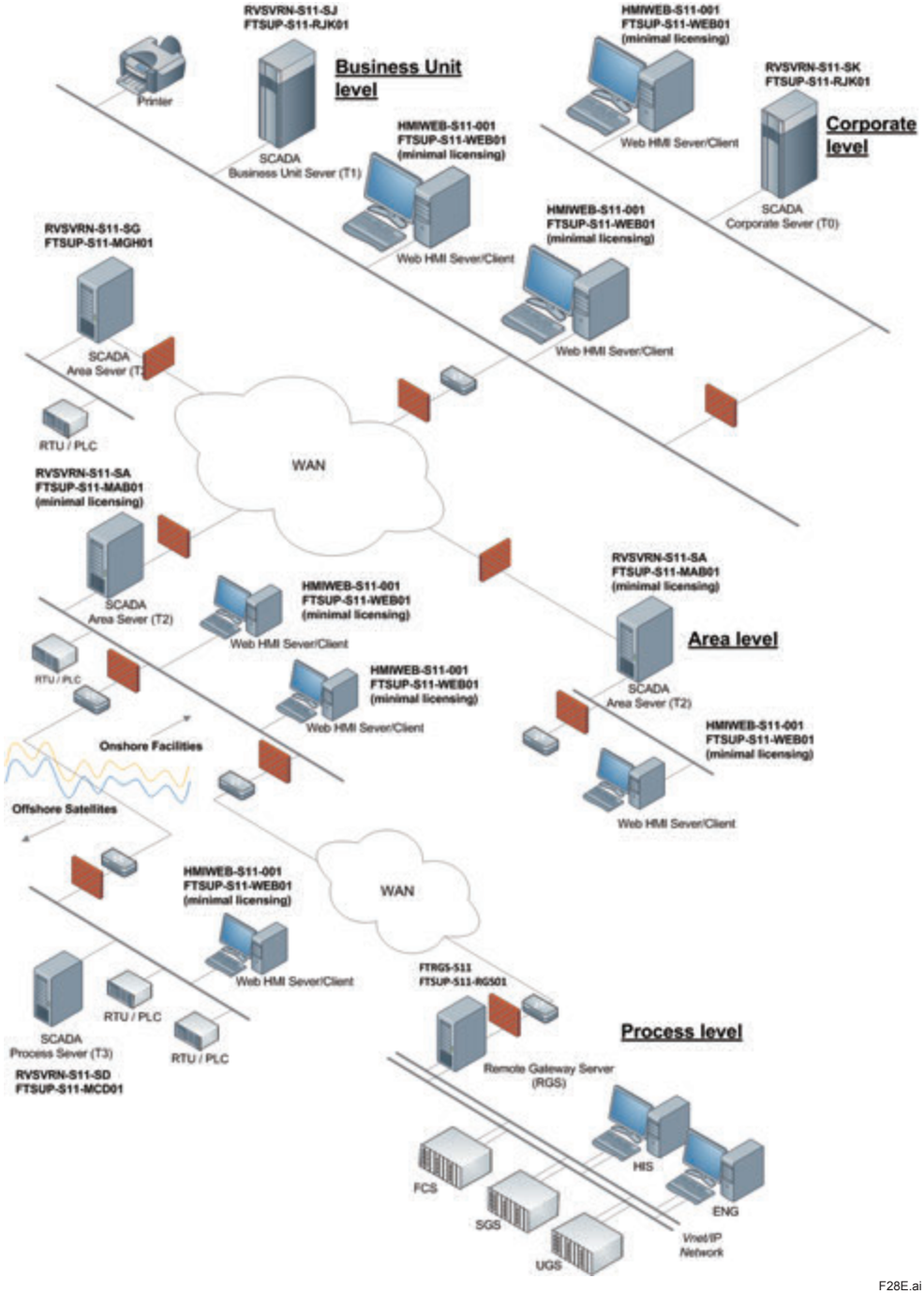
Corporate level
At the corporate level, all KPI's and other process data of all the business units are collected and aggregated providing a holistic view of the performance of the enterprise and its operational groups down to process level in real-time.

Enterprise Architecture [sample]



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The above sample of a typical Enterprise Architecture provides an impression of the flexibility to compose fit for purpose enterprise wide automation system integrated architecture. This functionality is offered without compromising on the autonomous operation of the individual server nodes that can directly serve information from all levels to a single visualization environment.

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● Hot-Standby Redundancy with Fail-over and Fail-back technology

FAST/TOOLS supports full communication and application redundancy, independent of applied communications media and system server hardware. There are several features available in FAST/TOOLS for building high availability system configurations combined with advanced guidance tools for some typical set-ups.

The Hot-Standby software module will take care of handling Dual, Triple, Quad or even Six (Tokuchu) redundant servers and redundant hard drive configurations (RAID), independent of applied communications media, geographical distance, different domains, and system server hardware. And with watchdog and heartbeat functionalities to manage which server is active and which server is standby and how and when to switchover to the standby server.

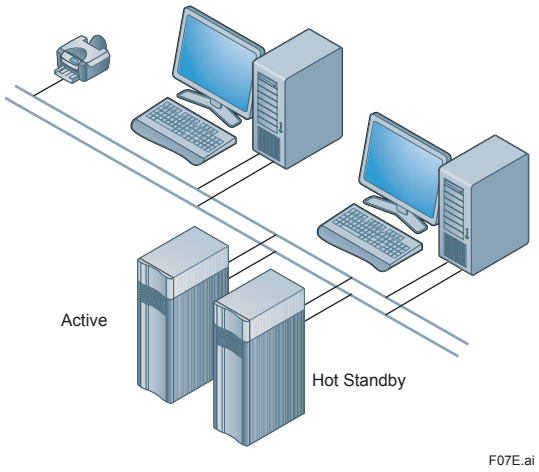

Figure Hot-Standby software Redundancy

Watchdog

This feature is only applicable for redundant server configurations. In this scenario one Watchdog process runs on each of the redundant servers. A Watchdog takes a number of inputs relating to the health the ‘active’ system as well as the current health of the ‘hot standby’ system. It decides whether the system is sufficiently healthy to carry on, or whether the redundant server should be brought online.

The Watchdog takes the following inputs as a basis for determining the health of the system:

- Current FAST/TOOLS health
- Current state of the network connection to the partner server
- Availability of network devices
- Results of custom scripts

For redundant server pairs twice the package and all the Server Package options must be ordered.

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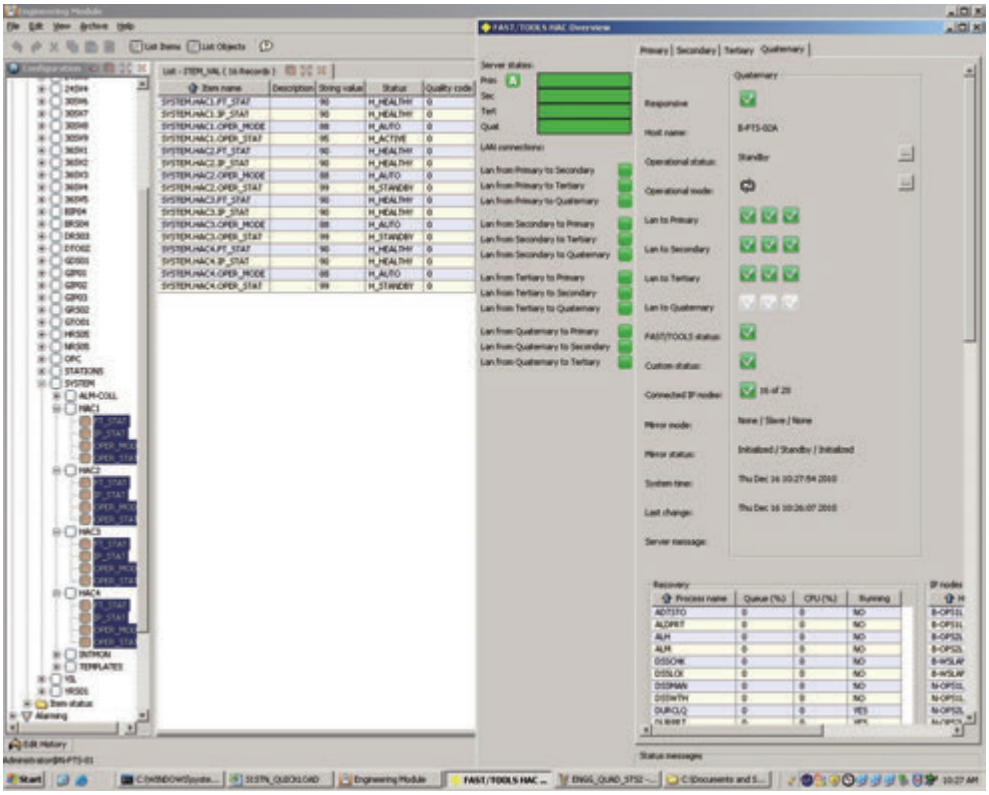

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The watchdog can support the following configurations:

- Up to 4 network interfaces
- Up to 20 IP device checks
- Provision for periodic checks using custom scripts as input to the health check

Active and Hot Standby

Once a redundant server combination is up and running, one server will be running FAST/TOOLS in its entirety, whilst the other server will be running a minimum set of FAST/TOOLS functions sufficient to monitor its own system and its associated redundant counter part. The server that is running the full real-time FAST/TOOLS environment is said to be the ACTIVE server and all SCADA functions will be handled by this machine. The other server that is running the minimum set is said to be the HOT STANDBY server and does not provide any SCADA functions (Note that only one server is allowed to be ACTIVE at any time).

Island situation

The ‘active’ server does not shut itself down in a bad health situation, but will be shut down by the ‘hot standby’ server. The only exception to this is when the server is in an island state. This means that the server detects that it has no connection to the partner, no connection to any other network devices and so is isolated from the rest of the world. In this case it has no connection to the field and no-one to shut it down, so the server will shut itself down in this case after a predefined timeout.

Initial status

When the redundant servers are initially started they will always start up as a HOT STANDBY server. The servers in a redundant configuration are of equal value, when the system starts initially and both servers are STANDBY the server that has been assigned as the PRIMARY server will become ACTIVE and the other (SECONDARY) server will remain in STANDBY mode.

Data synchronization

This mechanism secures - when one or the other server becomes active at any time - that the configuration and information on both servers is constantly synchronized, so that when the HOT STANDBY server takes over it does so with the latest configuration and information (mirror function).

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■ MAIN SYSTEM FUNCTIONS

● Process Visualization and Supervision

Human Machine Interface

The FAST/TOOLS HMI is fully Web based and allows the operator to easily and intuitively navigate through the operator displays in a browser-like environment. The HMI is designed for intranet deployment and delivers the benefits of incorporating web technology.

Some of the main benefits are:

- Minimum specification of PC hardware
- Centralized administration of software installation and management
- Load sharing through remotely deployed displays and distributed client/server architecture

CDSS (Collaboration Decision Support Solution) facilitates a holistic view over all key aspects of a producing company's operations and can be utilized to monitor the main production facilities.

Mobile Client HMI from mobile devices like tablet computers, smart phones and PDA's support HTML.

ASPA (Alarm System Performance Analysis) Module for improvement the processes to avoid operator overload and reduces the risk of critical alarms being overlooked.

Alarm Widget App for mobile devices like tablet computers, smart phones to show the current alarm list.

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The benefits for the operator are ease of use provided by the intuitive browser-like HMI standard that allows the grouping of FAST/TOOLS data into logical categories such as process mimics, alarm and event views, historical and real-time trending, faceplates and reports (which can be step less zoomed and panned in real-time). Furthermore the process mimics can contain multiple dynamic layers and visibility groups which become active and visible depending on user privileges, process conditions, zoom level, etc.

Although the FAST/TOOLS HMI is freely configurable to meet specific application needs the basic elements that can be enabled as part of the operator environment for supervision and control are:

- Layout
- Menu
- Toolbar
- Status line

The FAST/TOOLS HMI menu and toolbar accommodates for advanced display navigation through browser history, menu's and direct display call-ups.

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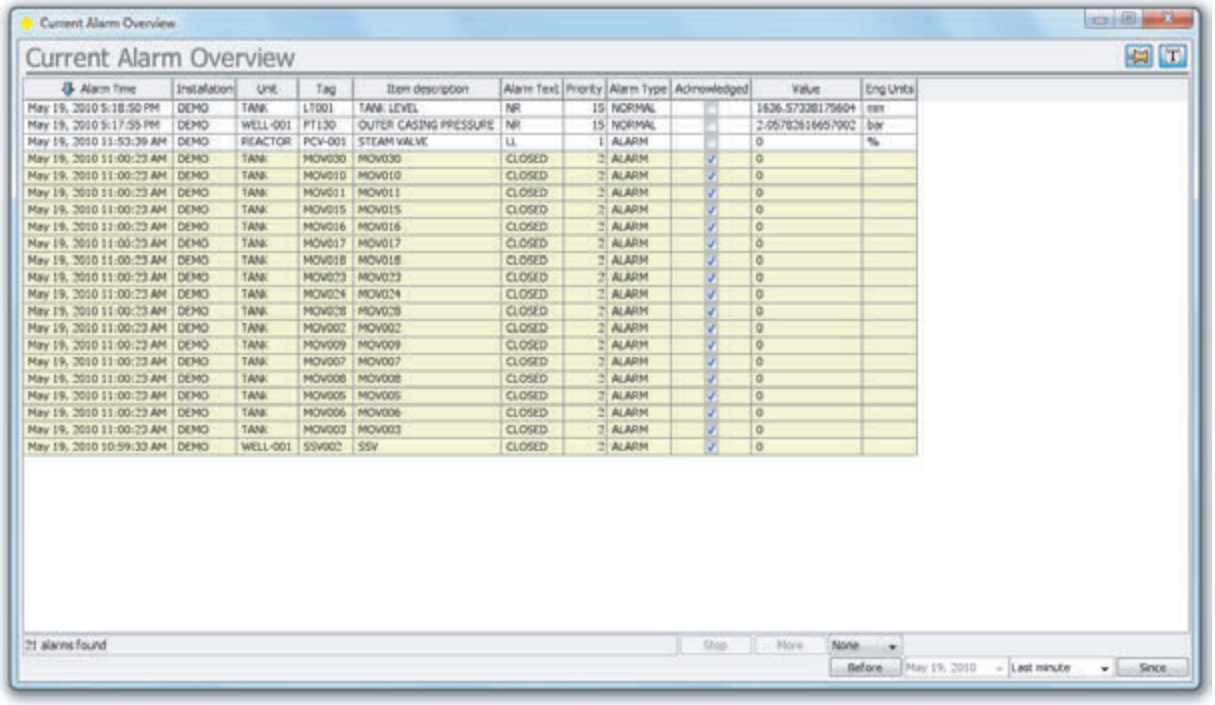
Alarm and Events
ALARM/FAST allows alarms to be presented on a number of different devices, like:

- Web HMI Servers & Clients
- Printers
- Paging systems (pagers, SMS, telephone)
- Acoustic devices (horns)

On Web HMI Servers & Clients the alarm presentation will, in most cases, be a real-time alarm table in a frame with scroll bars containing significant information for the operator. Additionally, graphical objects to which the alarms apply can be configured to change color, shape, position etc.



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In ALARM/FAST the alarm information can be customized for each device. Generally speaking the alarm text line will contain information regarding:

- Alarm priority (0-15)
- Alarm status (Alarm, Event, Acknowledged, reset, normal, etc)
- Date and time of the alarm (generated by FAST/TOOLS or via the timestamp received from the PLC or RTU, down to milliseconds)
- Item name, value, description and alarm description
- Alarm status text (Low, Low-Low, High, High-High, normal, underrange, overrange, offline, blocked, etc.)

Alarms are presented in two ways:

- Dynamically on display and/or printer (current alarms)
- Historical (chronological in time) on display and/or printer Historical alarms can be archived on disk or external storage.

Current alarms can be presented in a scalable frame with scrollbar controls that for example can be defined as a separate current alarm display or a three line banner at the bottom of the page. This overview is dynamic by nature; if an alarm no longer exists and is acknowledged (manually or automatically) then the alarm disappears from the screen. If there are no alarms active, this display or banner is empty. Every column of the alarm text line can be used to sort the alarm list so that current alarms can be sorted in:

- Priority base order
- Time base order
- Alarm status order
- Etc.

Every alarm status (Alarm, acknowledged alarm, repeated alarm, delayed alarm, normal, etc) can have its own distinct fore and background color or no background color. Furthermore definition of alarm line columns can be freely organized and represented.

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The historical alarm overview has the same functionality as described above for the current alarm overview. All status changes of alarms are represented in a fully scrollable historical alarm overview table with scroll bars and fast keys (page-up/down, etc.).

History and Trending
The FAST/TOOLS trend module provides trend visualization capabilities for all real-time and historical FAST/TOOLS data. The user interface is very intuitive and allows for fast open trend configuration.

Some of the main features are:

- 2D & 3D Rendering
- Full zoom capabilities and animation
- Historical & Real-Time trending
- Power full sliders for various axis like value and time
- Easy time-range selection
- Max 20 pens
- Automatic selection of history groups
- Supports relative and shift related time intervals
- Free to configure legend (location, description & transparency)
- Export trending data in bitmap and CSV data files
- Reversing of time and value axis
- Complete flexibility of window decoration and layout
- XY plots
- DTS (Distributed Temperature Sensing) trend

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The two types of trends in FAST/TOOLS are:

- Real-time trends
- Historical trends

The FAST/TOOLS trend module has an extensive library of ready-to-use trend templates. You only have to couple the item to the pen and the trend is ready to run. Besides using the trend templates it is possible to customize or adjust the trends from the library

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Some parameters you can set for a trend:

- The pen appearance (continuous line, dashed line, points)
- Start-time and stop-time (can be changed on-the-fly)
- Min and Max scaling value of the process variable that is trended
- The process variable to connect to a pen
- Starting and stopping the trending process
- The number of samples to show on the display
- A hairline can be activated to read value and time at a sampled point
- The sampling rate with which the trend screen is updated
- Different time scales by varying start- and end-time (can be changed on-the-fly)

Up to 20 pens can be assigned to values that can be plotted in time.

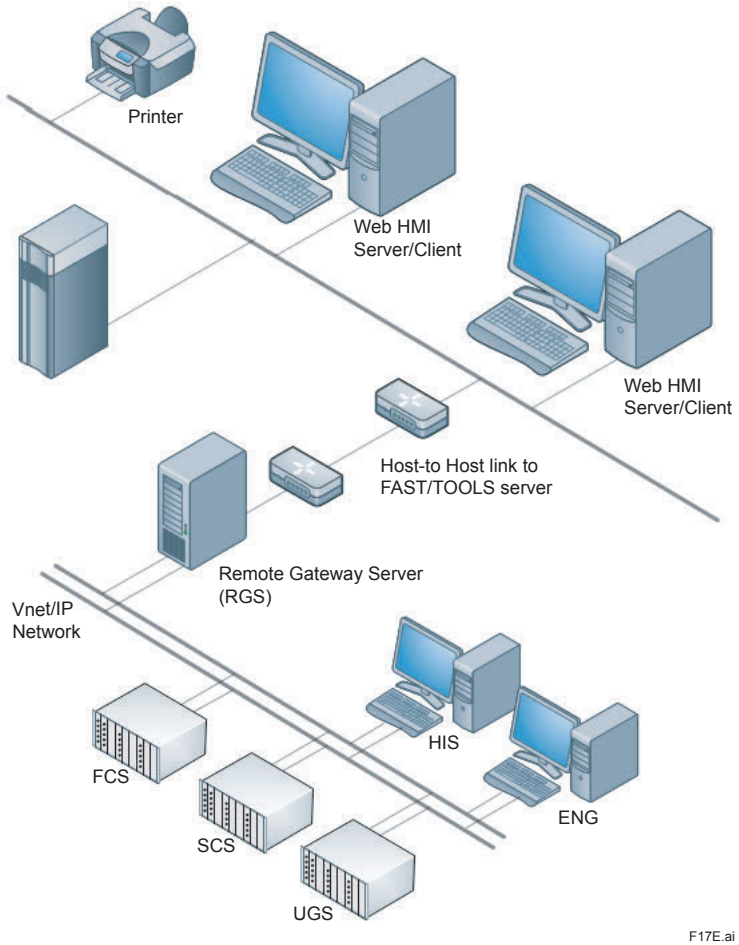
One of the more advanced features of the FAST/TOOLS Trend module is a build in option to synchronize the representation of trend data with the historical alarm statuses based on time/date. When moving the trend hairline across the historical or real-time trend time-line the associated alarms and their status at that specific point in time are displayed. Furthermore FAST/TOOLS trend module supports on-the-fly zooming and panning by the operator on any specific trend when this privilege is enabled.

● RGS (Remote Gateway Station)

The Remote Gateway Station (RGS) facilitates the integration between CENTUM VP and FAST/TOOLS.

RGS delivers an integrated automation solution, which supports a corporate wide automation strategy across multiple domains and geographies. This is achieved by providing access to Vnet/IP and managing the low bandwidth and intermitted communication requirements over remote network infrastructures at the top end from FAST/TOOLS.

Additional functions are provided for communication with CENTUM VP, which allows variable data and function block data to be read/write by FAST/TOOLS.



RGS Server connects to Vnet/IP just like a HIS or FCS, it serves as a gateway between CENTUM VP and FAST/TOOLS.

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Models and Suffix Codes
Each RGS in the integrated system has to be licensed with a RGS node license.

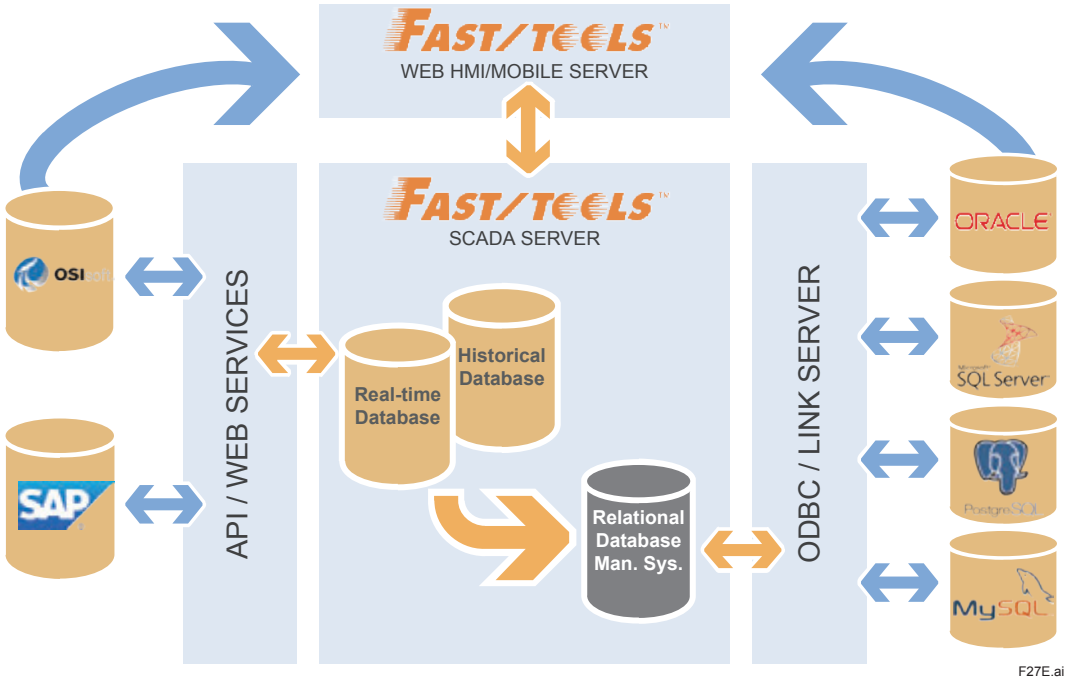
Model: FTRGS-S11 (For a redundant RGS configuration two licenses are required.)

For more infomation about the RGS see the General Specification no. GS 50A01A12-01EN.

● Embedded RDBMS engine

Introduction
The current capabilities in FAST/TOOLS for getting data sets into foreign database systems is to use the ODBC interface which connects directly to the FAST/TOOLS Data Set Services (DSS) layer. This is a powerful feature for connecting FAST/TOOLS data into the familiar office environment. In practice however this can introduce a performance hit when complex queries are performed; particularly joins that do not use database keys, since the internal database is optimized for fast storage rather than for database queries.

Functionality
For customers that want to perform more complex queries that cross-section FAST/TOOLS data and want to integrate that data into their own RDBMS environments (MSSQL, ORACLE and alike), an embedded RDBMS engine is available as well. This function has two advantages over the traditional ODBC connection. Firstly data that needs to be exposed to the foreign database is first mapped to local database tables, hereby offloading FAST/TOOLS DSS from the queries that need to be executed on this data. Secondly the shape of these (pre-defined) tables can be defined (modified) at engineering time, ensuring that only relevant data is exposed to the customer's database and that it is organized in a way that best suits the application. The RDBMS engine contains a "distributor" module that runs on the same machine as the customer's database and provides an ODBC interface to the mapped tables, allowing them to be used as "linked server" tables in the customer's RDBMS system. This method improves data integration by allowing these tables to be queried and reported in the same way as native tables.



Data Read/Write
The RDBMS engine function supports reading of three types of data; data set records, historical data and current item data. The mapping of these types of data to the target tables is performed using a dialog in the engineering module. Insertions, modifications and deletions to data set records will result in changes to the corresponding mapped tables. For historical data the data will be polled from data set services at the specified intervals and used to populate the target tables. For item data, values will be aggregated, creating a new record containing the minimum, maximum, average and number of updates for the specified sampling period.

For writing data back from the RDBMS to FAST/TOOLS, a special table will be provided that allows the application to update the value, quality and status of predefined items. The RDBMS engine triggers on updates to this table to perform the writing of the item within FAST/TOOLS. This may be necessary if useful data is calculated externally by the customer RDBMS, but would then be subsequently useful to expose within the FAST/TOOLS environment.

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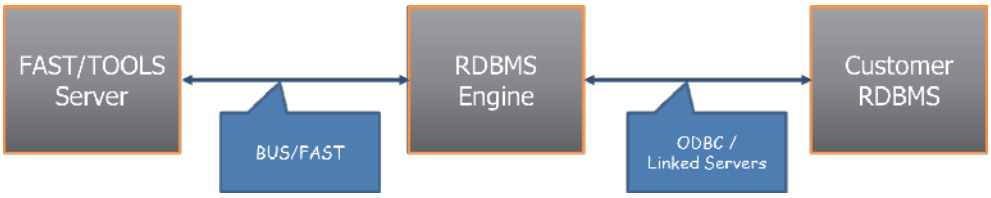
Data Security
There are a number of security aspects associated with this feature Firstly the data exposed through the RDBMS connector is only data that has been explicitly mapped at engineering time, including the items that can be written back by the application. Data that has not been mapped is simply not available to the application. Secondly since the tables are exposed through an ODBC interface that is not running on the FAST/TOOLS server, the database administrator is responsible for controlling user access to the linked tables (GRANT, DENY), without comprising FAST/TOOLS data.

Set-up options
There are several setup options to fit any specific customer and performance requirements. In the picture below each functional module operates independently and could be deployed on any combination between one and three physical (or virtual) machines.



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For example, all three modules may run on one machine, or each may have its own dedicated machine (server or PC). Another possibility is to run the RDBMS engine (Exposure Module) on the same physical system as the existing customer RDBMS system, which may be a good solution if the additional load of this functionality does not impact the existing RDBMS server in a way that would compromise its existing purposes. Importantly, the communication between each of these three modules should be transparent once configuration of the connections between them is completed.

A connection between the FAST/TOOLS server (left-hand module) and its RDBMS engine (middle module) is established via FAST/TOOLS internal secure domain and media independent communications infrastructure BUS/FAST in a manner similar to make connections between FAST/TOOLS servers in a distributed architecture.

The right-hand module represents the existing customer RDBMS system that the customer may wish to use in order to access the FAST/TOOLS data stored within the embedded RDBMS engine.

In case the FAST/TOOLS server and its RDBMS engine are not running on the same physical server and network connection is lost all data will be redirected to a preservation location on the local disk so that it may be send properly once the connection has been restored.

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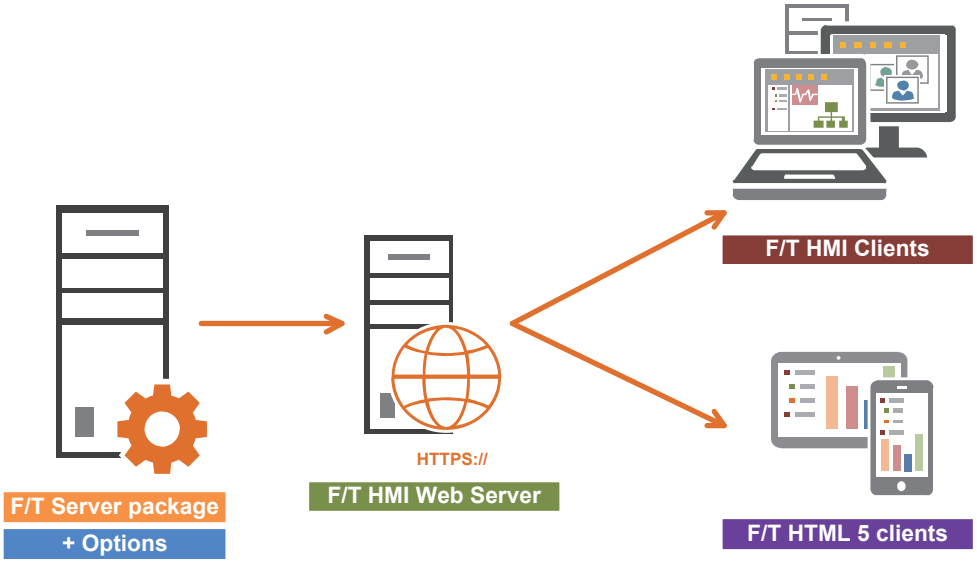
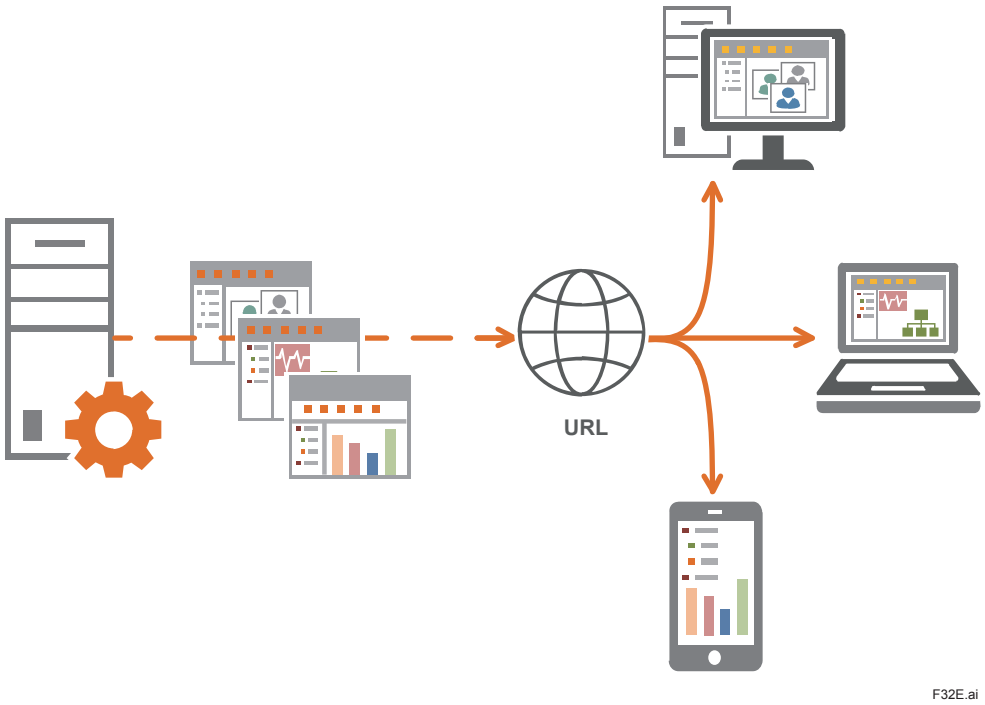
● Mobile Client HMI

For access to HMI graphics of the FAST/TOOLS system from mobile devices like tablet computers, smart phones and PDA's support for HTML is available. Typically these devices do not support Java VM to run the native FAST/TOOLS HMI applets.



Numerical as well as graphical mimics can be developed in the standard FAST/TOOLS HMI Edit Module within the specified boundaries as described herein. Deployment of FAST/TOOLS mimics to mobile clients is executed through the mimic translation tool to automatically convert the mimics to HTML format.



Legend Figure:

- FAST/TOOLS Web Server: HMI Server for Web-HMI and Mobile Clients
- Web-HMI Client: Java VM based operator interface web client
- Mobile-Client: HTML based operator interface web client

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The boundaries of the mimic translation tool provided below should be noted as guidelines for development and deployment of mimics for mobile devices based on the used HTML standards. Continuous advancements are made to enhance the HTML support as part of service packs and new releases of the FAST/TOOLS software package.

- The conversion specification is one way direction i.e. from FAST/TOOLS to HTML
- HTML files will have the same names as the converted FAST/TOOLS displays.
- Supported visualization components are: Line, Rectangle, Arc, Polygon, Ellipse, Spline, Text, Number, Icon, Input components, Push buttons, Toggle button, Check box, Radio button, Slider, Spinner, Combo box, List, Text field, Password field, Text Area, Number field and Date/time field.
- Rotation must be set to zero when a connection is set on the “Rotate” property of the component and the component is reshaped.
- Layers with item connection on visibility and transparency properties are supported
- Edit actions allowed on components to be converted are: horizontal/vertical flip, arrange on layers, (un)grouping and shaping properties like: unite, subtract and intersect.
- Supported display properties are: naming, tab icon, width, height, background color/image/blinking, open on event
- Item attributes and object signals can be read/write to FAST/TOOLS server under authorization
- Alarm acknowledgement
- Basic trend functionality is supported
- Faceplates can be opened
- Improved secure communication layer (web sockets)

Current and historical alarm overviews are exported as tables and updated based on refresh freq. Dynamic update of the HTML display files will be done by requesting the Webserver for updates on a fixed time interval. The updates are done per scan and not per event. The request interval is default set to 1000 milliseconds.

The generated HTML file is W3C Valid and uses HTML 5 and SVG 1.1 specifications. The file should run on all browsers that support:

- HTML 5
- SVG
- Javascript

Current support for Inline SVG in HTML 5 are HTML5 supported web browsers.

Because the HTML files are rendered by browsers and not by OS, the operating system does not matter. The only influence is the web browser being used (see table above to ensure compatibility).

Due to the fact that the HTML based Mobile Client HMI will be deployed on mobile devices there is not a default option for opening multiple pop-up windows. Faceplates will appear in the same/new window.

For the Mobile Client HMI (HMTL5) we support a big range of graphic functions. For the detailed list of the supported functions see Instruction Manual (IM) USER/FAST Editor (IM 50A03D00).

Models and Suffix Codes

HMIMOB-S11

A default login window similar to the Operator Interface login will be deployed to the webpages folder with the name index.html which will be the default start page.

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The Ok button will send the username and password to the Web-HMI Server. The Web-HMI Server will reply with the Layout and Initial Display of the user. For security reasons the HTTPS communication must be used.

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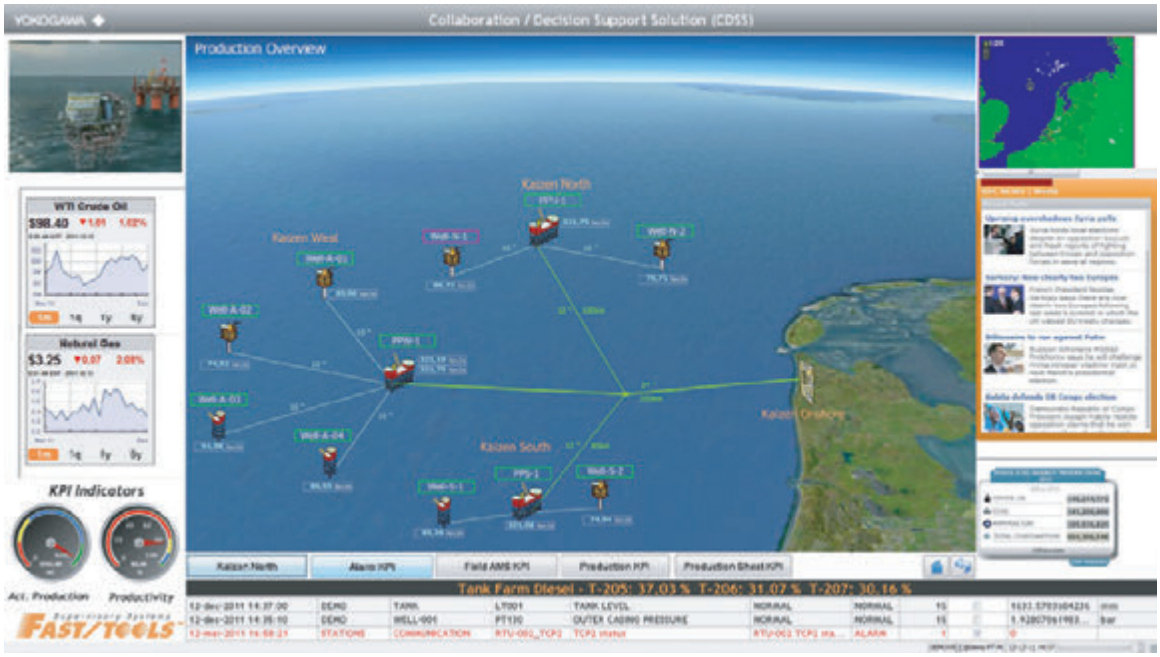
● CDSS (Collaboration Decision Support Solution):

Functionality
FAST/TOOLS CDSS dashboards facilitates a holistic view over all key aspects of a producing company's operations and can be utilized to monitor the main production facilities like (petro) chemical complexes, power plants, as well as its sub processes such as; utilities, reactors, tank farms, loading- and offloading facilities.



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FAST/TOOLS CDSS allows integration of information from all kinds of data sources such as video streaming (CCTV, CAMs), URL (Internet/Intranet), databases, spreadsheets, pdf documents, etc. These sources are available as standard components that can be utilized in mimics and dashboard views with minimal configuration effort.

Deployment
FAST/TOOLS CDSS can be utilized for a number of objectives that contribute to improved effectiveness and performance of new and installed production management systems

Examples of FAST/TOOLS CDSS deployment objectives:

- Delivery of essential information from all connected sources shared to specific enterprise groups by means of pre-defined trends & reports
- Support to move from transactional processes to 'real-time' interaction and acts as an enterprise information monitoring system
- Optimize human resources efficiently across local and remote production facilities by centralizing knowledge for more effective and consistent use.

Components
The Web Browser (Internet Explorer) component embeds full- or part of- web pages in the operator mimics, menu's, side bars and banners (for example pages of a weather forecast site or specific information from the company's intranet). It is possible to add controls and status fields easily and connect them to the command and navigation properties of the component. For instance, to add Push Buttons and connect them to the Go Back, Go Forward, Go Home, Reload and Stop properties and add a Text Field and connect it to the URL property.

The Internet Explorer (IE) web browser component can only be used when the web HMI client is based on MS Windows. When deploying Web HMI clients on other platforms the Java based web browser can be used which is similar to the IE web browser component however with less commands and navigation properties.

The Media Player (Windows Media Player) component embeds and plays media files (sound and video) in the operator interface (for example instructional videos). With the display properties of the component it can be determined what controls will be available (e.g. playback controls and a tracker bar). For the basic playback controls push buttons can be added and connected to the command properties. The Media Player component is based on MS Windows Media Player. Please refer to the information provided by Microsoft for the media file types that can be played.

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The PDF Viewer component embeds PDF documents into the operator environment (for example the Operator's Handbook). With the properties of the component it can be determined which controls will be available (e.g. controls for page browsing, zooming and printing). For the basic page browsing controls and the printing controls it is possible to add Push Buttons and Number Fields for the page number connected to the navigation and printing properties.

Configuration
When licensed the CDSS components described above will become available in the FAST/TOOLS Editor Module. One license (FTCDSS-S11) is required per FAST/TOOLS project.

Models and Suffix Codes
FTCDSS-S11

Supported platforms: Microsoft systems.

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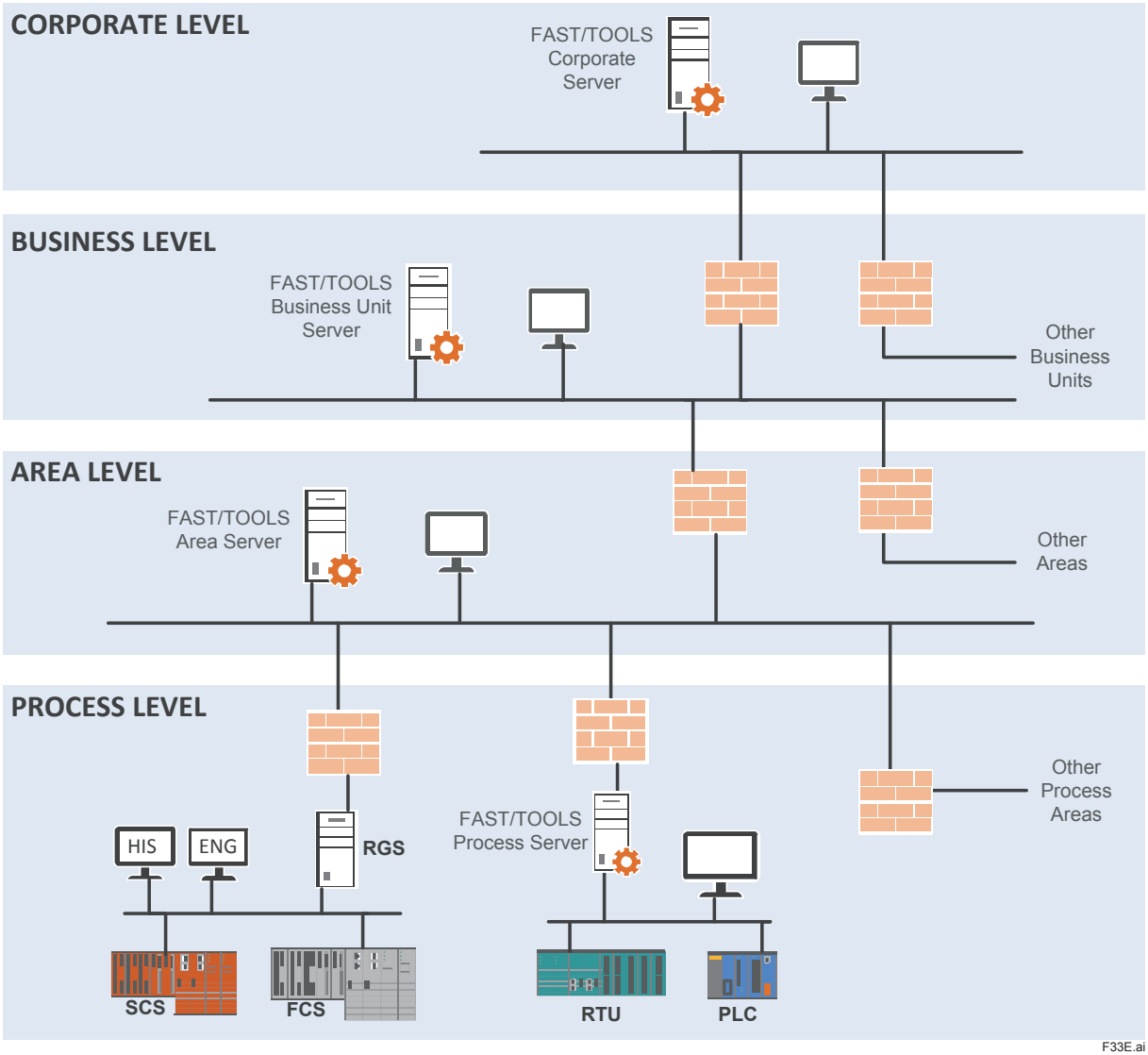
● Enterprise Operations

Enterprise operations delivers the process data to the users at each automation level (see figure below). A process operator controls the process on the Process level, up to KPIs that are supplied to the financial systems of the corporation at the corporate level.



The FAST/TOOLS Enterprise Operation Module is responsible for gathering the data to be displayed to the user, and to process the user responses. For this it uses the name space server to establish the most optimal path to access data to be presented to the user. It tries to find alternative paths to the data if access to a certain server is temporarily interrupted. The rule based security model authorizes a user to perform certain operational tasks.

In the figure above, four networks are depicted: the Corporate network, the Business Unit network, the Area network and the Process network. These networks can be one physical network where the sections are separated by routers and firewalls, or these networks can be physically separated. In the latter case, a Business Unit server may have two network cards, one that connects the server to the Business Unit network, and one that connects the Business unit server to the Corporate network.

The logical automation network supports plug and play. When at any level a server is added to the physical network, then the logical automation network will discover this and update its routing tables with the new server.

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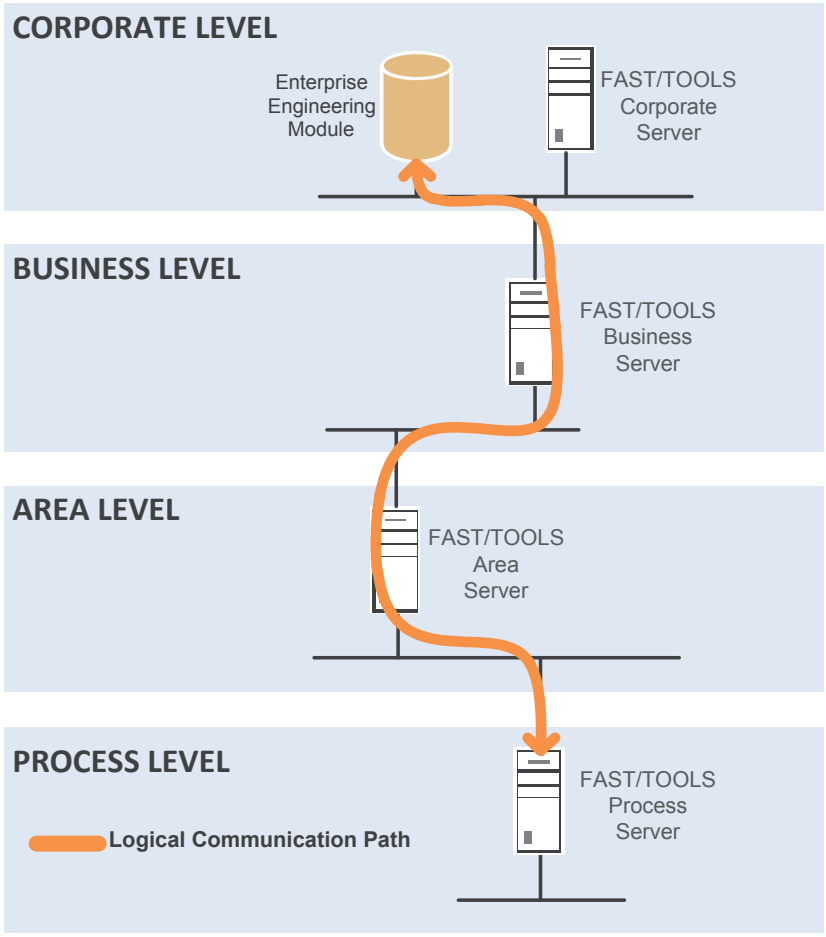

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In the figure above a logical connection between an Enterprise Operation Module located at the corporate level and one of the process servers its visualization environment is gathering information from is depicted. This allows the Enterprise Operations Module to connect to multiple FAST/TOOLS servers across several levels and to visualize the gathered information in one Mimic as illustrated here below.

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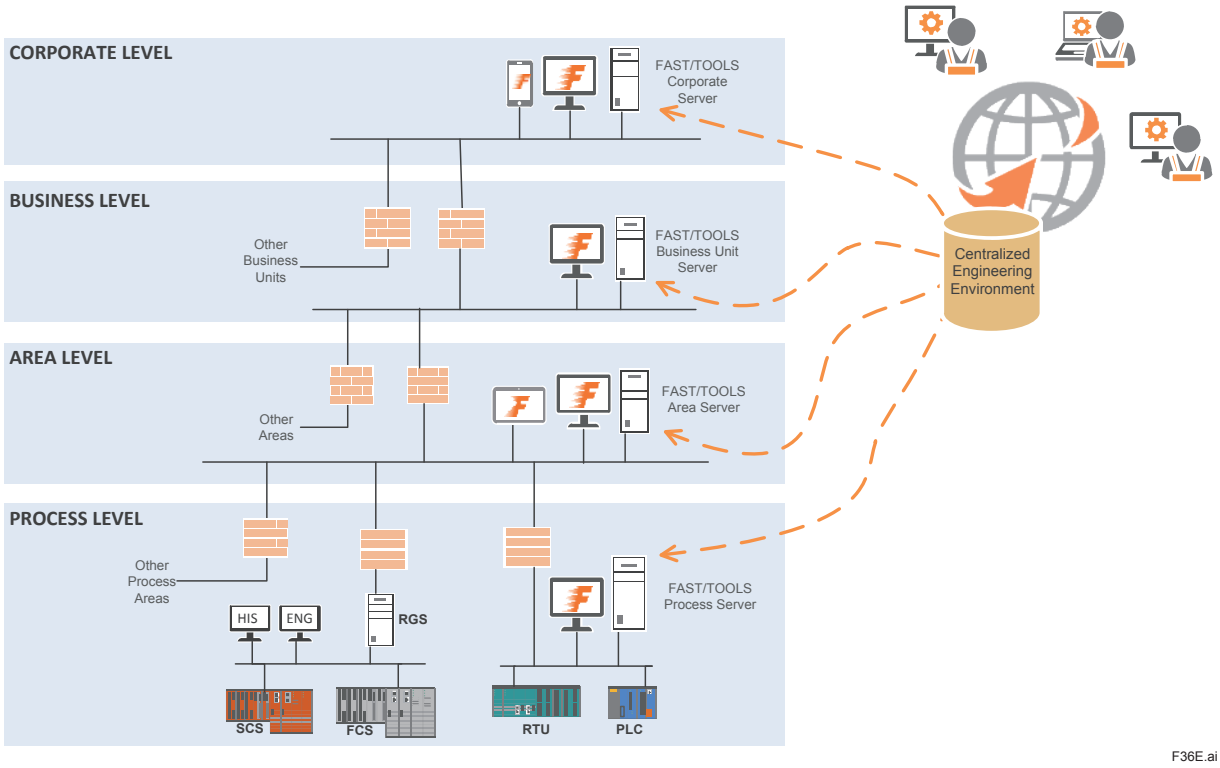
Enterprise Engineering
FAST/TOOLS allows for multi-level, multi system architectures in an information model.

These large geographical dispersed systems require a different approach from an engineering perspective with central engineering and managed deployment of configurations.

The FAST/TOOLS Enterprise Engineering Module is responsible for this system wide engineering where the Enterprise Engineering database contains all master enterprise definitions for all servers and deployment information (what runs where).

Engineering can be done online and offline simultaneously by local and remote engineers on an integrated enterprise engineering environment. This is easier to manage, less restrictive and less complex. A dedicated engineering workstation does not load other systems, does not require network access to servers during engineering and provides a method for standardizing engineering configurations across servers. This reduces project and engineering costs significantly.



The Enterprise Engineering Station contains;

- Single engineering environment containing all common enterprise definitions and deployment data.
- Deploy and synchronize to multiple levels and areas from a single database.
- Local and remote access for multiple enterprise engineers on an integrated enterprise engineering environment

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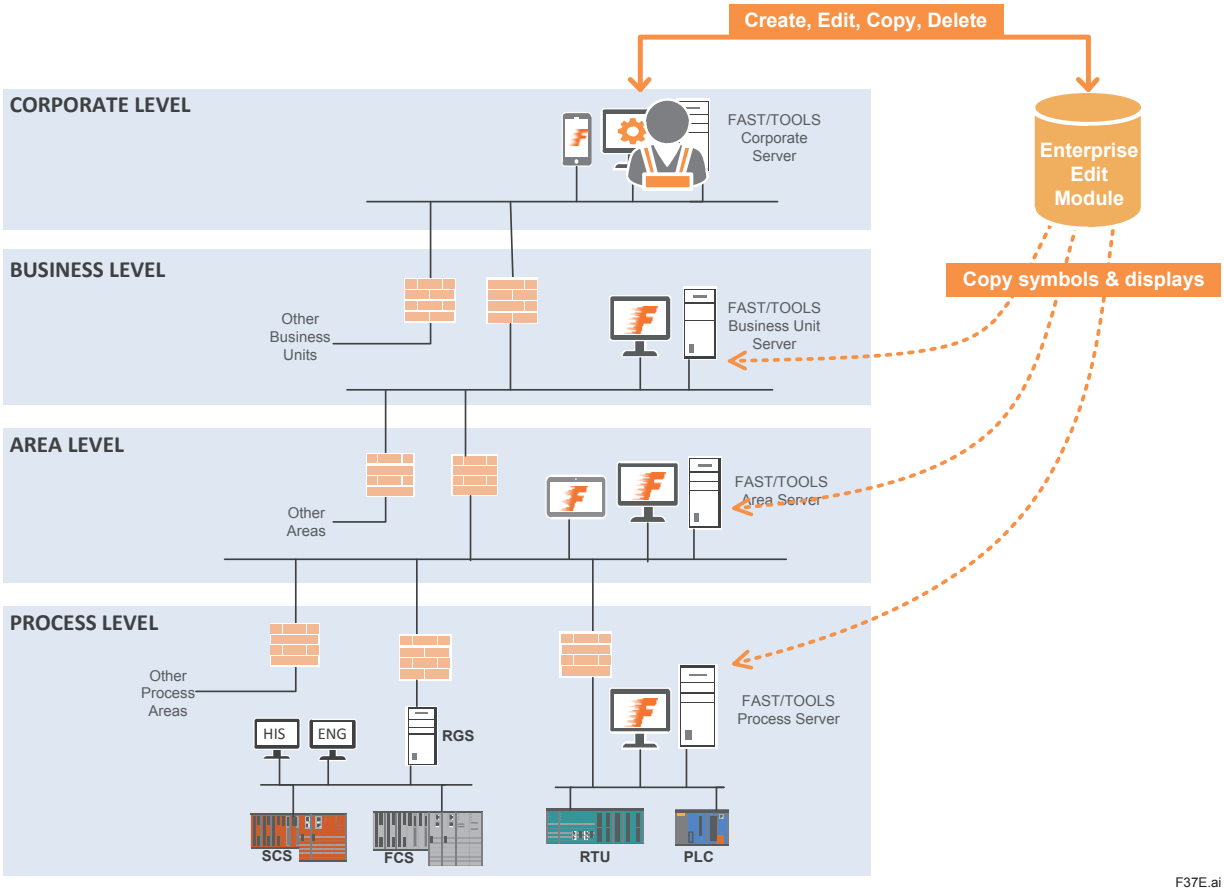

The Enterprise Edit Module contains;

- Enterprise display management functions
- Edit enterprise displays local and remote
- Copy displays to other nodes
- Can be run from any enterprise node

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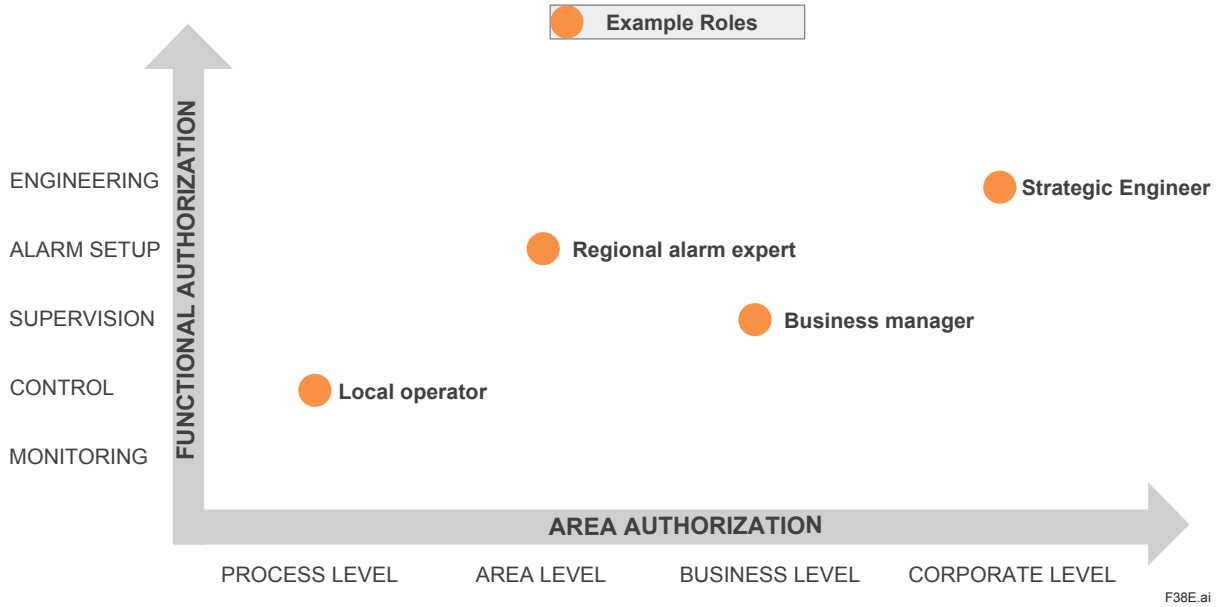
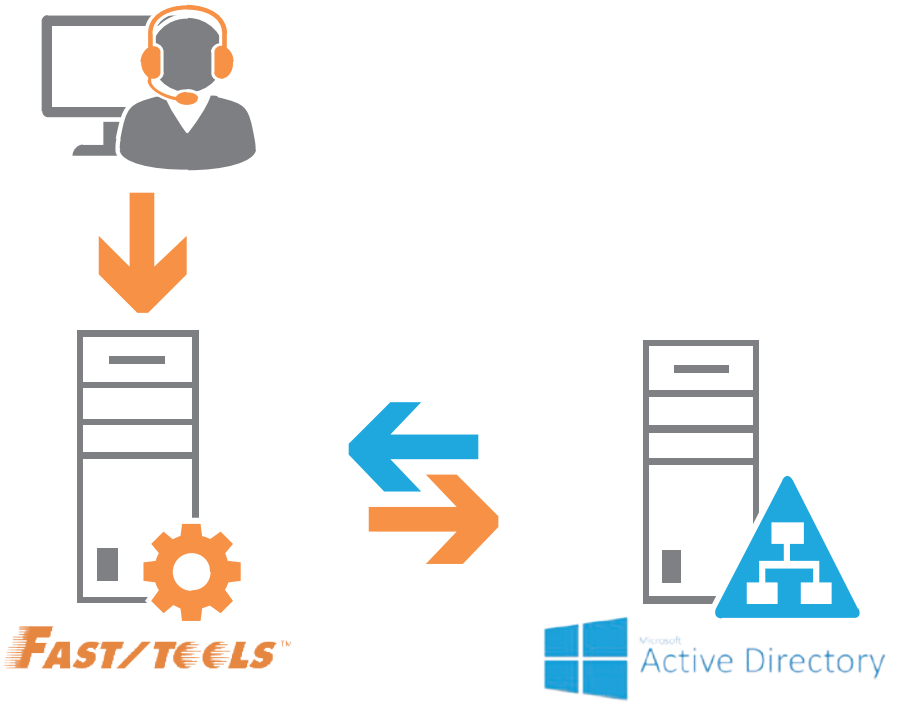
Role based authorization & authentication
In an Enterprise environment multiple roles are identified with different information requirements. These roles also require functional authorization versus area authorization to allow who has access to what, therefore requiring Role based Authorization & Authentication.



To enable these roles in a secure manner not only the IT based security, the OS software based security but also the SCADA based application security needs to work harmoniously.

Therefore FAST/TOOLS supports the integration with Active Directory.

Users can login with their Windows name and password, where Active Directory contains all user profiles and permissions for all applications in domain. A FAST/TOOLS user Group name for this user is stored in AD and the user group name from AD is mapped to the user group name in FAST/TOOLS. This is so-called “Single sign-on”.



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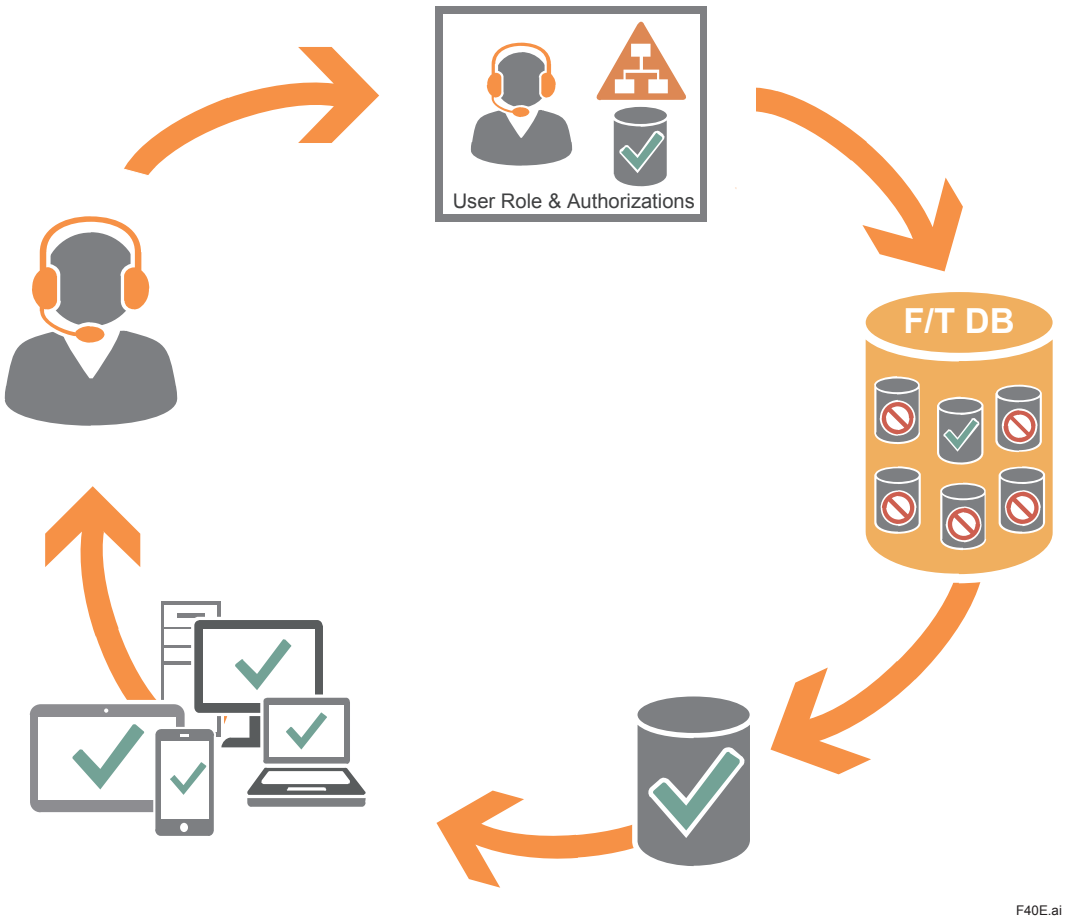
This concept is further enhanced into role-based geo intelligence.

This means that Users can login with their Windows name and password, where the User Role determines which data and controls are accessible. The FAST/TOOLS database enables the allowed and usable data which can be presented to devices assigned to the user profile.



Secure and Robust networking and routing

Application communications between organization layers will use FAST/TOOLS networking and routing. New robust routing protocol function is introduced which will find the requested tags. Only UDP ports required for FAST/TOOLS multi-node communications which need to be available through firewall between layers.

Existing FAST/TOOLS data set authorization and process area mechanisms will control access to enterprise configuration and local engineering capabilities.

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● ASPA (Alarm System Performance Analysis) Software Module:

ASPA supports the alarm system performance improvement processes to avoid operator overload and reduces the risk of critical alarms being overlooked, causing wrong or to late decisions putting safety as well as the continuity and quality of production at stake.

Functionality
FAST/TOOLS ASPA delivers critical statistical methods, views and tools providing performance analysis in relation to the guidelines of EEMUA 191, ISA18.2 to ensure alarm system quality and effectiveness.

Based on key performance measurements embedded in FAST/TOOLS ASPA, the behaviour of the alarm system will be presented from different angles. This will deliver holistic and informative views providing guidance for improvement.

Deployment
FAST/TOOLS ASPA can be utilized for a number of objectives that contribute to improved effectiveness and performance of new and installed alarm systems based on FAST/TOOLS.

Examples of FAST/TOOLS ASPA deployment objectives:

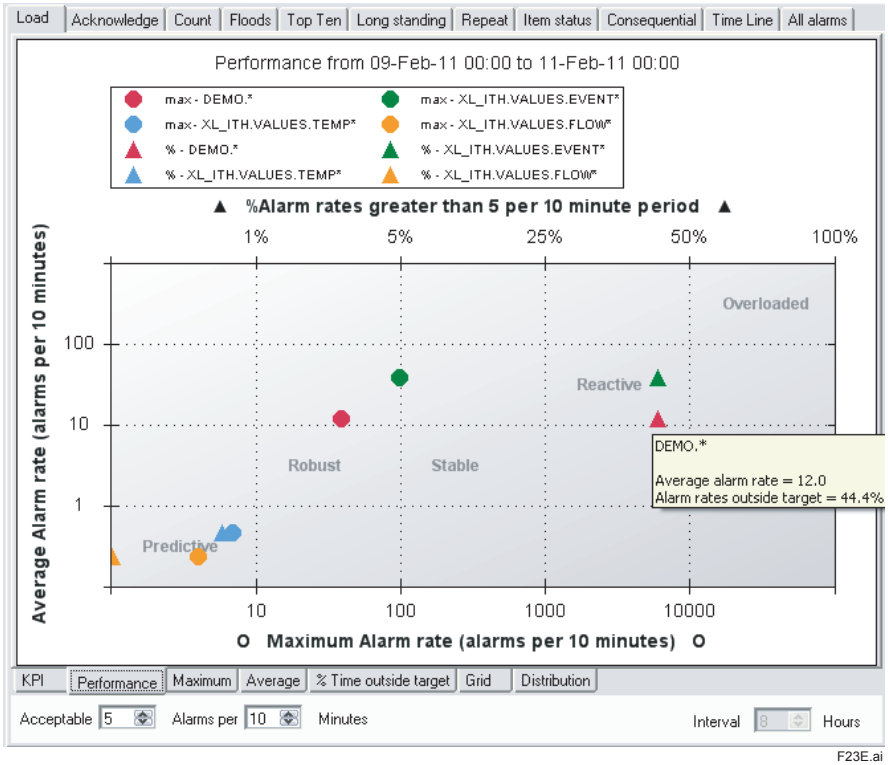
- To set and measure performance targets to enhance the quality
- To analyse the effectiveness of an existing alarm system
- As a management tool for improvement programs such as Human Centric Operations
- To identify specific nuisance alarms and number of standing, delayed and suppressed alarms

EEMUA 191 - ANSI/ISA 18.2 Metrics
The metrics (or charts) are the basis in the assessment of whether operators will find the alarm system easy to work with and does not exceed the ergonomically acceptable workload and quality. This is made visible by categorizing the state of the alarm system performance into five levels as defined by EEMUA 191.

ASPA identifies the worst case load during any ten minute time slice and categorizes this to alarm system performance levels in accordance with EEMUA 191.

Supported Alarm Analysis Metrics (Charts)
ASPA offers an extensive set of predefined detailed metrics;

The Load report is based on section 4.1.1 of the EEMUA 191 directive. It provides the operator load factor based on the number of alarms exposed per 10 minutes time slice.



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The Alarm Performance Summary Metric show 9 key measurements point of you alarm system calculated over a specific period of days (section 16.5 of ISA18.2).

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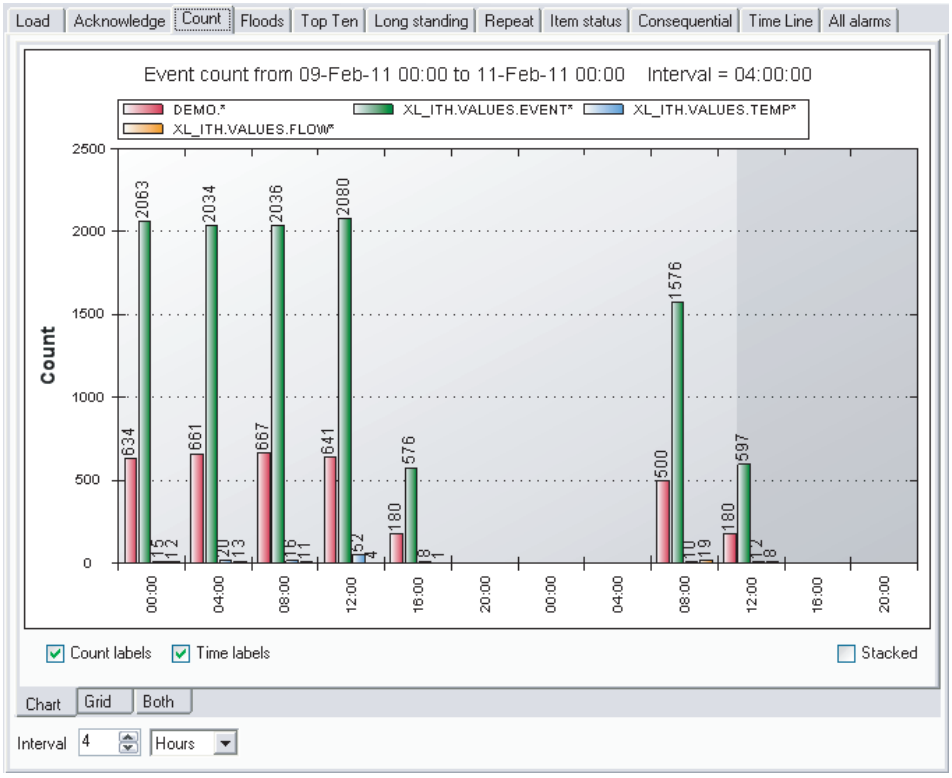
The Acknowledge report provides an overview of the time windows within alarms were acknowledged by the operator. The Count report is based on section 4.2.1 of the EEMUA 191 directive and provides the counted number of alarms.



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The Floods report is based on section 4.2.1 and appendix 12.7 of the EEMUA 191 directive. It is similar to the Count report, but in addition it allows filters on periods with a particularly high alarm activity that can be displayed. These periods are normally related to major process changes, plant trips or start-ups.

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The Top Ten report is based on section 4.2.1 and appendix 12.6 of the EEMUA 191 directive. It distinguishes the top 'ten' of FAST/TOOLS items (found in all group filters) that have caused the most alarms. In addition other rankings can be made as well (e.g. top 3 or top 20).

The Long Standing report is based on section 4.2.1 of the EEMUA 191 directive. It distinguishes the FAST/TOOLS items with alarms that endured ('stood') for the longest time period. In contradiction with the name of the tab it is also possible to rank items with alarms that endured the shortest time. Alarms that were still standing at the end time of the time period are not considered.

The Repeat provides an overview of FAST/TOOLS items with alarms that have been repeated most times. Only particular items are considered, namely items for which the alarm has been set to repeat as long as the alarm is not withdrawn.

The Item Status report is based on section 4.2.1 of the EEMUA 191 directive and displays the numbers of alarms per status (e.g. how many HIGH alarms occurred? And how many LOW alarms? etc.).

The Consequential report is based on section 4.2.1 and appendix 12.11 of the EEMUA 191 directive and focuses on (simple) patterns of alarms, i.e. how many times an alarm A was directly followed by alarm B? The tab shows a table in which each row is a particular pattern.

The Time Line report puts various views of the alarms on a timeline.

The All alarms report displays a table with all the alarms fetched for the analyzed period.

All charts and reports as described above can be printed, saved as screen dumps in PNG format and exported to CSV or XML.

Comparison function
The following report has the comparison function to view report generated in the past.

- Load report
- Acknowledge report
- Count report
- Floods report
- Top Ten report
- Long Standing report
- Repeat report
- Item Status report
- All Alarm report

Configuration
The ASPA software (FTASPA-S11) can be either installed on the FAST/TOOLS Web HMI Server or the FAST/TOOLS Application Server platform (RVSVRN or MSSVRN). One license is required to connect to one FAST/TOOLS server (or when you use the HAC configuration to the active server).

When the ASPA software module is installed on a FAST/TOOLS Web HMI Server it requires the HMIWEB-S11 license to run ASPA.

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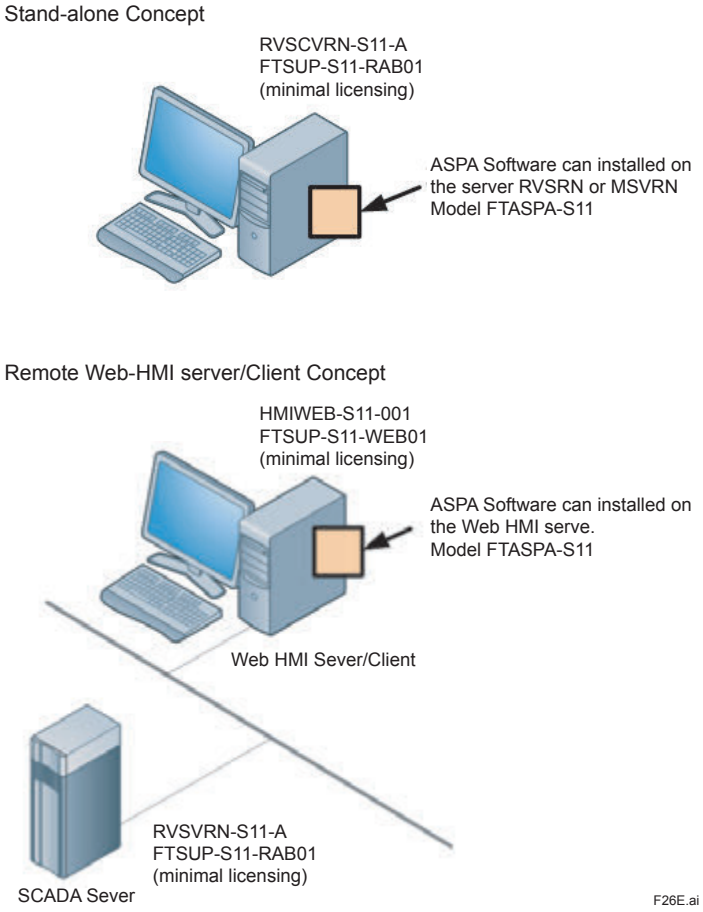

The customized user specific filter selections made can be stored in the ASPA software for later reuse to evaluate improvements and consistent reports. Export of the filters selections is possible as well.

Models and Suffix Codes
FTASPA-S11

Supported platforms: Microsoft systems

For Hardware Recommendations see section System Requirements.

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● Process Field I/O Communications

FAST/TOOLS supports many native PLC/RTU driver protocols developed for data acquisition, to enhance communication performance and reliability. FAST/TOOLS can provide direct communication links to various brands of DCS/PLC/RTU on the same SCADA server. It also has many field proven communication interfaces through Fibre Optics, serial lines, radio, satellite, PSTN, etc.

The part of FAST/TOOLS that takes care of communication with I/O devices, like RTU's, distributed I/O, and PLC's, is called EQUIPMENT/FAST. It uses device specific I/O-drivers, polls the equipment and updates the real-time database. FAST/TOOLS supports as standard the equipment types listed below:

EQUIPMENT/FAST Driver				
		TCP/IP	Terminal server (*4)	Serial
Yokogawa STARDOM	(*1)	yes		
Yokogawa DAQStation	(*1)	yes		
Yokogawa DAQMaster	(*1)	yes		
Yokogawa SMARTDAC+	(*1)	yes		
Yokogawa FA-M3	(*1)	yes		
Yokogawa ProSafe-COM	(*1)	yes	yes	yes
Yokogawa Host-Host (*9)	(*1)			
Modbus Slave	(*1)	yes	yes	yes
Modbus Master	(*1)	yes	yes	yes
Beckhoff BK8100	(*1)		yes	
Rockwell CIP	EQP-S11-ROC	yes		
Rockwell DF1	EQP-S11-ROC		yes	yes
Rockwell DH+	EQP-S11-ROC	yes		
Siemens 3964R	EQP-S11-SIE			yes
Siemens SAPI-S7 (*2)	EQP-S11-SIE	yes		
Emerson BSAP	EQP-S11-EME		yes	yes
Emerson Fisher ROC	EQP-S11-EME		yes	yes
WITS level 0 slave (*3) (*5)	EQP-S11-RTU		yes	yes
WITS level 0 master (*3) (*5)	EQP-S11-RTU		yes	yes
DNP3 Master	EQP-S11-RTU	yes	yes	yes
HEX repeater	EQP-S11-RTU		yes	
TIE (*6)	EQP-S11-GEN			yes
HART router	EQP-S11-GEN		yes	
Yokogawa Vnet/IP driver (*7)	EQP-S11-SCS			
Melsec Mitsubishi drver(*8)	EQP-S11-MEL	yes		yes
IEC 60870-5-101	EQP-S11-IEC		yes	yes
IEC 60870-5-102	EQP-S11-IEC		yes	yes
IEC 60870-5-103	EQP-S11-IEC		yes	yes
IEC 60870-5-104	EQP-S11-IEC	yes		
IEC 61850 (*10)	EQP-S11-IEP	yes		

*1: Standard in server package RVSVR, MSSVR & UNSVR.
*2: Software needed from Siemens; SIMATIC.NET SAPI-7 software package. Only for Windows platform
*3: Only on Windows platform.
*4: FAST/TOOLS system is communicated by TCP/IP to the Terminal Server. Terminals Server is communicated serial to device.
*5: Wellsite Information Transfer Specification (WITP).
*6: Telemetry Integration Environment (TIE) .
*7: Vnet/IP network is used. Software needed (CHS5700) and Vnet/IP card VI702 in FAST/TOOLS server. Only for Microsoft platform.
*8: Software needed from Mitsubishi: EZ-Socket. Only for Windows platform. Software on FAST/TOOLS DVD.
*9: FAST/TOOLS DURM network is used.
*10: Support MMS specification, read and write from/to tags. Included the SISCO stock layer software.

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● Distributed Temperature Sensor Function

DTS (Distributed Temperature Sensing), the technique used involves a fibre-optic cable in which by means of light pulses measures the temperature along the length of the cable.

FAST/TOOLS has an equipment driver which is able to retrieve and store the DTS data from YOKOGAWA DTSX200 and DTSX3000 modules.

Beside this there is also a advance Trend Component to present the information.

The FAST/TOOLS trend component for DTSX display show

- 3-dimensional data from DTSX
- Temperature for each point along the fiber is measure at each sample interval
- Trend display can distance vs temperature or time vs temperature

There is no lost of DTSX samples by network interrupted. The DTSX samples stored in the DTSX unit and FAST/TOOLS automatic recover of the stored samples.

Models and Suffix Codes
FTDTSX-S11

FTDTSX can run on one FAST/TOOLS server, model RVSVRN or MSSVRN.

For a redundant FAST/TOOLS server configuration twice the package must be ordered. Driver supports only TCP/IP communication. Communication with the DTSX200-N0EN version 1.05 or higher is based on WITSML.

● System Support Functions

FAST/TOOLS is delivered with a complete set of diagnostic tools for every module which allows online monitoring of:

- Configuration settings
- Real-time values of items, communication statistics, process-load
- Time related issues
- Status values
- And other module specific parameters

These diagnostic tools are used to locate suspicious faulty situations in the SCADA system and to optimize the performance of the SCADA system. Performance optimization can be done by:

- Balancing network traffic between e.g. a server and workstation in a redundant network
- Preventing queue overflows by adapting queue sizes of FAST/TOOLS processes
- Optimizing scan times of external process variables

In addition some diagnostic tools allow logging diagnostic data to a file on disk, which can be used for analyses later on.

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■ FUNCTIONAL SPECIFICATION

Please find below the functional limits of the FAST/TOOLS software package.

Table (1/2)

Functional Element	Details	Limits	Remarks
Item tags	Name Length	256 Characters	The depth of sections can be zero up to 128, length of the entire path not longer then 256 total characters (ANSI). Section name length is max 31 characters (ANSI).
	Description Field	80 Characters	
	Value clamping		Can be applied to alarm limits and process value scale
	Sub-items	16 per Item	
	Integrator	1 sec. resolution	
	Pulse counter	long integer	
	Min/max indicator		
	Rate of change	1 sec. resolution	
	Limit and dead band	HH, H, L, LL, Dead band	
	Blocks of items, unit & installation		Preserve current values
	Data compression	30% on average	
Displays / Symbols	Name Length	31 Characters	
	Number of displays and symbols	Unlimited	
	Symbol Library		Standard library contains more than 3000 symbols
	Multi Monitor Support	Dual or Quad	Conforms to available desktop resolution and video hardware performance.
	Multi-language support		
	UTF-8 character sets		
Connectivity	OPC server and OPC client		DA (v2.0) and A&E (v1.02) (tested with compliance tool v2.05a) OPC UA DA client V1.0
	RDBMS engine		High performance bi-directional RDBMS connectivity
	ODBC Server		For both process and configuration data. ODBC API conformance level 1, SQL conformance level minimum.
	API for easy connection of third party software		Available for C, Java and VB .NET
	EQUIPMENT/FAST drivers	Up to 10000 EQP per Server / Front-End. Every EQP can handle max. 4095 drivers.	Applicable for every FAST/TOOLS server, based on TCP/IP connections, and as long as the protocol supports it like STARDOM, DNP3 etc.
Alarm Management	Number of Alarms	Unlimited	
	Alarm Acknowledgement		Freely definable alarm states & acknowledgement methods.
	Delayed Alarms	By seconds (65,535 max)	
	Repeated Alarms	By seconds (65,535 max)	
	Alarm Collections	32,767 max	
	First out and first up annunciation	Unlimited	
	Area of Interest	Up to 16	
	Alarm Priority groups	Up to 16	
	Alarm rerouting		Free rerouting of alarms to e-mail, pagers, etc.
Operator log/ audit trail			Store actions of users and SCADA system; who, where, when and why.
Trends	Number of pens	Up to 20 per trend	
	Zooming and Panning		
	Sample period	Up to 1 msec.	
	Update period	Up to 1 sec.	
	Hairline cursor		
	Synchronization with alarm overview		
	Scalable timeline and resolution		

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Table (2/2)

Functional Element	Details	Limits	Remarks
Reports	Report generation		
	Report browser / manager		Ad-hoc, Scheduled and event-based
	Printer Management		
Data Archiving	Averaging of history values		On scan and event based
	Managing historical files		
	Automatic archiving		External storage of all new historical data
Security	User name & password	Unlimited	
	Authorization groups	Unlimited	
	Process areas	0-999	Operator access level per area
	Automatic login		After system login
	Areas of interest	Up to 32 entries per item	Labels describing the functional area of a process tag

■ SOFTWARE PERFORMANCE

FAST/TOOLS has been extensively tested on its software performance. These tests were conducted on a system with the SCADA server hardware configuration and specification as stated below:

Dell PowerEdge 2900: Tower Chassis
Quad core Intel Xeon E5410 2x6MB Cache, 2.33GHz 1333MHZ FSB
4GB FB 677MHz Memory (2x2GB dual rank DIMMs) (win2003 uses a maximum of 2,99GB)
2 * 146GB, SAS, 3.5-inch, 15.000 rpm Hard Drive
3 * Broadcom NextXtreme II 5708 1-Port Gb Ethernet NIC w/ TOE, Cu, PCIe
48x SATA CDRW/DVD Combo Drive, IDE, Half Height
Windows operating system

System load on which test results are based is up to 100.000 item updates per second over a network. Please note that because FAST/TOOLS is event driven an update rate of 100.000 items is only applicable to very large system configurations. The results of the performance tests are presented in the tables below:

SCADA Server CPU load:

Items in database	Items updated per second	Server CPU load in %
10.000	10.000	4%
20.000	20.000	4%
50.000	50.000	4%
100.000	100.000	5%
150.000	100.000	5%
200.000	100.000	5%
500.000	100.000	5%
1.000.000	150.000	5%

SCADA System Network load:

Items in database:	100.000
Updates per second	Network load in Kb/s
0	25
500	35
1000	45
1500	55
2000	65
2500	75
3000	85
3500	95
7500	165
10000	215
12500	260
17500	350
22500	445
27500	535
30000	590
32500	630
37000	715
42500	815
47500	910
49500	945
50000	955
60000	1140
70000	1325
80000	1515
90000	1700
100000	1845

Note: Small deviations from the above results may occur in practice due to the open nature of the system and the freedom to use any qualified customer of the shelf system and network hardware.

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■ OPERATING ENVIRONMENT

FAST/TOOLS is supported on the server platforms as defined below. For each platform, the required operating system is specified.

Platform	Operating System
Microsoft	Microsoft Windows Server 2012 R2 (64-bit) Windows 8.1 Enterprise, Professional (64-bit) Windows 7 Professional SP1 (32-bit, 64-bit)
LINUX	Red Hat Enterprise Linux 7 & CentOS 7 (64-bit)
IBM	AIX 6.1L, 64bit
HP	HP-UX11.31, 64bit

■ SYSTEM REQUIREMENTS

The specified hardware is a minimum recommendation for optimal software performance. Furthermore it should be taken into account that additional non FAST/TOOLS applications may require additional resources

● SCADA Server

Items	Specifications	
CPU	Microsoft	Intel © Core™ i7, 3.40 GHz or better.
	Red Hat Linux 7	Intel © Core™ i7, 3.40 GHz or better
	AIX 6.1L	IBM Power ® 710 Express server, 3.8 GHz or better
	HP-UX 11.31	HP Integrity LX3600 Server
RAM	At least 8 GB	
Hard Disk	1TB (7200 rpm) At least 300 Mbytes of free space is required for the software. Additional disk space is required to store configuration and historical data: add on average 2150 byte per item definition, 100 byte per history sample , 550 byte per event sample, 18 Kb per class, 2 Kb per object, 2 Kb per report and 30 Kb per display symbol.	
Ethernet adapter	An Ethernet adapter that is supported by the operating system is required at installation. Please note that for HAC (High Availability Computing) a dedicated network adapter is preferred.	
DVD-ROM Drive	A DVD-ROM drive that is supported by the operating system is required.	

● Front-End Server

Items	Specifications	
CPU	Microsoft	Intel © Core™ i7,3.40 GHz or better.
	Red Hat Linux 7	Intel © Core™ i7,3.40 GHz or better
	AIX 6.1L	IBM Power® 710 Express server, 3.8 GHz or better
	HP-UX 11.31	HP Integrity LX3600 Server
RAM	At least 8 GB	
Hard Disk	1TB (7200 rpm) At least 300 Mbytes of free space is required for the software. Additional disk space is required to store configuration data: add on average 2150 byte per item definition, 18 Kb per class, 2 Kb per object, 2 Kb per report and 30 Kb per display symbol.	
Ethernet adapter	An Ethernet adapter that is supported by the operating system is required at installation.	
DVD-ROM Drive	A DVD-ROM drive that is supported by the operating system is required.	

● Web HMI Server

Items	Specifications	
CPU	Microsoft	Intel © Core™ i7, 3.40 GHz or better.
	Red Hat Linux 7	Intel © Core™ i7, 3.40 GHz or better
RAM	At least 8 GB (for ASPA 16 GB)	
Hard Disk	1TB (7200 rpm) At least 200 Mbytes of free space is required. Additional space is required for display and symbols.	
Ethernet adapter	An Ethernet adapter that is supported by the operating system specified is required at installation.	
DVD-ROM Drive	A DVD-ROM drive that is supported by the operating system is required.	
Peripherals	Sound card and speaker are required for audible messages	
Web browser	Internet Explorer 11 or Mozilla Firefox 36	

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● Web HMI Client

Items	Specifications	
CPU	Windows 8.1 Enterprise, Professional (64-bit) Windows 7 Professional SP1 (32-bit, 64-bit)	Intel® Core™ i5, 2.50 GHz or better
RAM	At least 4 GB	
Hard Disk	500 GB (7200 rpm) At least 1 GB of free space is required.	
Ethernet adapter	An Ethernet adapter that is supported by the operating system specified below is required at installation.	
DVD-ROM Drive	A DVD-ROM drive that is supported by the operating system is required.	
Peripherals	Sound card and speaker are required for audible messages	
Web browser	Windows 8.1 Enterprise, Professional (64-bit) Windows 7 Professional SP1 (32-bit, 64-bit)	Internet Explorer 11 or Mozilla Firefox 36

● Web HMI Mobile Client

Items	Specifications
Web Browser Support	Internet Explorer 11 Mozilla Firefox 36 Google Chrome 36 Apple Safari 8
Alarm Widget App	Android 4.2 or Android 4.3
Web Browser Support HTML5	Google Chrome 41 and/or Apple Safari 8

■ NOTICE FOR THIRD-PARTY PRODUCTS

FAST/TOOLS is software that makes the most of commercial off-the-shelf (COTS) software, so third-party products meeting the specifications required by FAST/TOOLS are myriad. The pieces of software described in the General Specifications and User's Manuals of FAST/TOOLS, will operate correctly to the extent of the specifications. Yokogawa has conducted combination tests on third party products that many want to use with FAST/TOOLS. These tests may also be performed on new third-party products as required. Nevertheless, these tests simply check the basic operations in combination with FAST/TOOLS and are not intended to assure correct operations. The most recent results of these tests will be available to those who have concluded a support contract.

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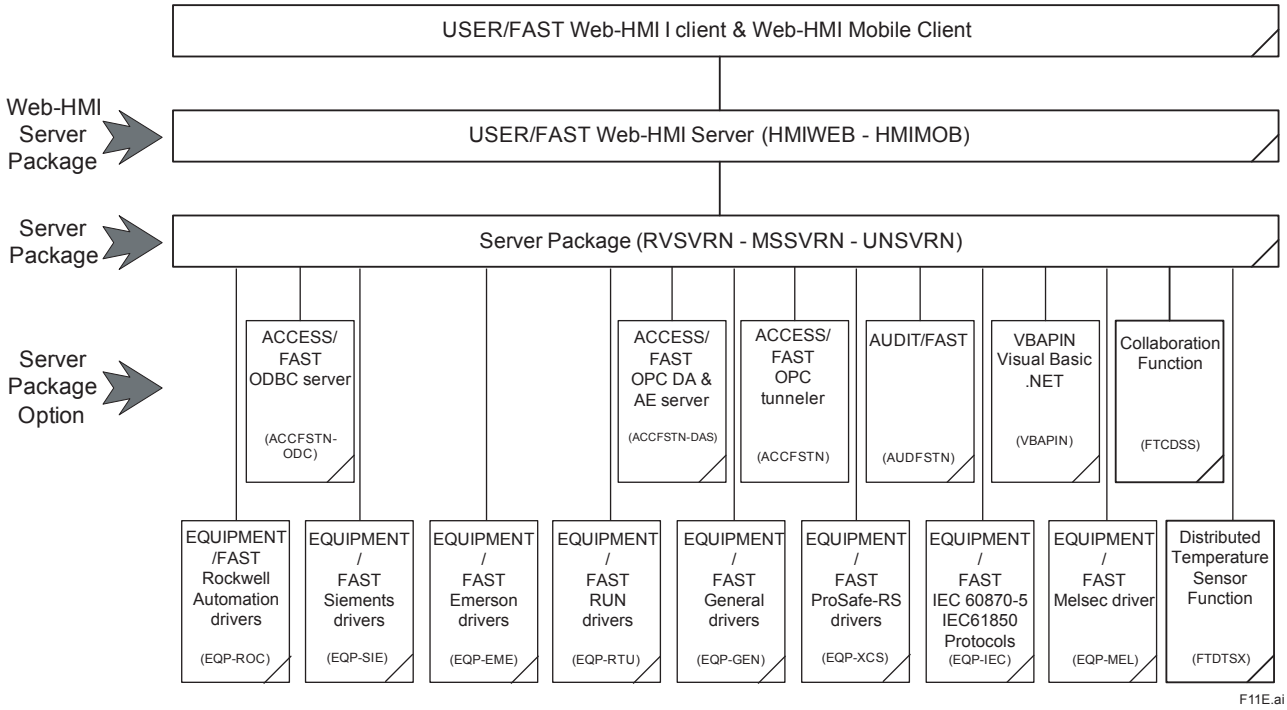
■ MODELS AND SUFFIX CODES

● FAST/TOOLS Package Structure

The following figure shows the package structure of FAST/TOOLS.


USER/FAST Web-HMI l client & Web-HMI Mobile Client
Web-HMI Server Package
USER/FAST Web-HMI Server (HMIWEB - HMIMOB)
Server Package
Server Package (RVSVRN - MSSVRN - UNSVRN)
Server Package Option
ACCESS/ FAST ODBC server (ACCFSTN-ODC)
ACCESS/ FAST OPC DA & AE server (ACCFSTN-DAS)
ACCESS/ FAST OPC tunneler (ACCFSTN)
AUDIT/FAST (AUDFSTN)
VBAPIN Visual Basic .NET (VBAPIN)
Collaboration Function (FTCDSS)
EQUIPMENT /FAST Rockwell Automation drivers (EQP-ROC)
EQUIPMENT / FAST Siements drivers (EQP-SIE)
EQUIPMENT / FAST Emerson drivers (EQP-EME)
EQUIPMENT / FAST RUN drivers (EQP-RTU)
EQUIPMENT / FAST General drivers (EQP-GEN)
EQUIPMENT / FAST ProSafe-RS drivers (EQP-XCS)
EQUIPMENT / FAST IEC 60870-5 IEC61850 Protocols (EQP-IEC)
EQUIPMENT / FAST Melsec driver (EQP-MEL)
Distributed Temperature Sensor Function (FTDTSX)

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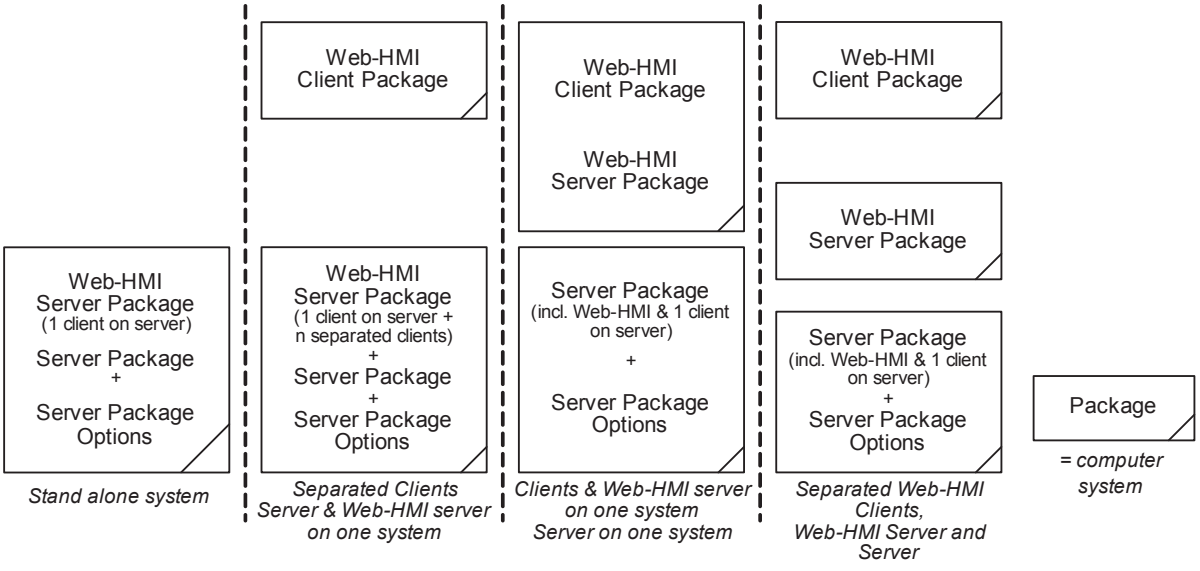
Note: Bold items are Model numbers.
Note: For all Server Package option a Server package is required except VBAPIN and Collaboration Function (FTCDSS).
Note: HMIMOB is an extention of Web-HMI Server Package. So HMIWEB is always needed.
Note: OPC clients (DA/AE/UA) are included in Server packages.

● FAST/TOOLS Computer Segregation

The following figure shows the computer segregation of FAST/TOOLS. It shows which package can be combined on the same computer system.


Web-HMI Server Package (1 client on server) + Server Package Options
Stand alone system
Web-HMI Client Package
Web-HMI Server Package (1 client on server + n separated clients) + Server Package + Server Package Options
Separated Clients Server & Web-HMI server on one system
Web-HMI Client Package
Web-HMI Server Package
Server Package (incl. Web-HMI & 1 client on server) + Server Package Options
Clients & Web-HMI server on one system Server on one system
Web-HMI Client Package
Web-HMI Server Package
Server Package (incl. Web-HMI & 1 client on server) + Server Package Options
Separated Web-HMI Clients, Web-HMI Server and Server
Package
= computer system

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The Web-HMI client can run both the operator interface and the application database configuration interface.

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● Windows Server Package

		Description
Model	RVSVRN	FAST/TOOLS Microsoft Windows Server Package
Suffix Codes	-S	Software licence
	1	Always 1
	1	Always 1
	-SA	Max. item numbers: 250
	-SB	Max. item numbers: 500
	-SC	Max. item numbers: 1,000
	-SD	Max. item numbers: 2,000
	-SE	Max. item numbers: 4,000
	-SF	Max. item numbers: 8,000
	-SG	Max. item numbers: 16,000
	-SH	Max. item numbers: 32,000
	-SJ	Max. item numbers: 64,000
	-SK	Max. item numbers: 128,000
	-SL	Max. item numbers: 256,000
	-SU	Max. item numbers: unlimited

Note: Standard drivers are: STARDOM, DAQStation, DAQMaster, SMARTDAC+, FA-M3, Host-Host, Modbus slave, Modbus master & Beckhoff BK8100.
Note: FAST/TOOLS Server - Client configuration only
Note: Configuration only for Windows platform.
Note: Audit trail module (Model: AUDFSTN) is not included.
Note: For server extensions, see Windows Server Package for Upgrade.
Note: For High Availability Computing (HAC) twice the package and all the Server Package options must be ordered.
Note: OPC clients (DA/AE/UA) are included in server package.

● Windows Server Package – Distributed

		Description
Model	MSSVRN	FAST/TOOLS Microsoft Windows Server Package – Distributed
Suffix Codes	-S	Software licence
	1	Always 1
	1	Always 1
	-SA	Max. item numbers: 250
	-SB	Max. item numbers: 500
	-SC	Max. item numbers: 1,000
	-SD	Max. item numbers: 2,000
	-SE	Max. item numbers: 4,000
	-SF	Max. item numbers: 8,000
	-SG	Max. item numbers: 16,000
	-SH	Max. item numbers: 32,000
	-SJ	Max. item numbers: 64,000
	-SK	Max. item numbers: 128,000
	-SL	Max. item numbers: 256,000
	-SU	Max. item numbers: unlimited

Note: Standard drivers are: STARDOM, DAQStation, DAQMaster, SMARTDAC+, FA-M3, Host-Host, Modbus slave, Modbus master & Beckhoff BK8100.
Note: For server extensions, see Windows Server Package - Distributed for Upgrade.
Note: For High Availability Computing (HAC) twice the package and all the Server Package options must be ordered.
Note: OPC clients (DA/AE/UA) are included in server package.

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● LINUX & UNIX Server Package

		Description
Model	UNSVRN	FAST/TOOLS LINUX & UNIX Server Package
Suffix Codes	-S	Software licence
	1	Always 1
	1	Always 1
	-SA	Max. item numbers: 250
	-SB	Max. item numbers: 500
	-SC	Max. item numbers: 1,000
	-SD	Max. item numbers: 2,000
	-SE	Max. item numbers: 4,000
	-SF	Max. item numbers: 8,000
	-SG	Max. item numbers: 16,000
	-SH	Max. item numbers: 32,000
	-SJ	Max. item numbers: 64,000
	-SK	Max. item numbers: 128,000
	-SL	Max. item numbers: 256,000
	-SU	Max. item numbers: unlimited

Note: Standard drivers are: STARDOM, DAQStation, DAQMaster, SMARTDAC+, FA-M3, Host-Host, Modbus slave, Modbus master & Beckhoff BK8100.
Note: For server extensions, see FAST/TOOLS LINUX & UNIX Server Package for Upgrade.
Note: For High Availability Computing (HAC) twice the package and all the Server Package options must be ordered.

● EQUIPMENT/FAST

		Description
Model	EQP	FAST/TOOLS EQUIPMENT/FAST (drivers)
Suffix Codes	-S	Software license
	1	Always 1
	1	Always 1
	-XCS	YOKOGAWA Vnet/IP driver
	-ROC	Rockwell Automation drivers (*1)
	-SIE	Siemens drivers (*2)
	-EME	Emerson drivers (*3)
	-RTU	RTU protocol drivers (*4)
	-GEN	General drivers (*5)
	-IEC	IEC 60870-5 Protocols (*6)
	-IEP	IEC 61850 Protocol
	-MEL	Melsec driver

Note: Not all drivers are supported on all platforms. Some drivers will need third part software. Some drivers will support only TCP/IP and/or Serial.
Note: For drivers not listed above, please see the General Specification of FAST/TOOLS.

*1: includes CIP, DH+ & DF1 protocol, for e.g. ControlLogix or PLC5
*2: includes 3964R & SAPI-S7 driver, for e.g. Siemens S5 & S7 PLCs
*3: includes BSAP & Fisher ROC driver, for e.g. Bristol Babcock RTUs
*4: includes WITS level 0 slave, WITS level 0 master, DNP3 & HEX Repeater driver
*5: includes TIE & HART Router driver
*6: includes IEC 60870-5-101, IEC 60870-5-102, IEC 60870-5-103 & IEC 60870-5-104

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● ACCESS/FAST

		Description
Model	ACCFSTN	ACCESS/FAST
Suffix Codes	-S	Software licence
	1	Always 1
	1	Always 1
	-ODC	ODBC sever
	-DAS	OPC DA & AE Server (only on Windows version)
	-TUN	OPC Tunneller client / server (only on Windows version)

Note: OPC DA/AE/UA clients are available in Server packages.

● AUDIT/FAST

		Description
Model	AUDFSTN	AUDIT/FAST Audit Trail
Suffix Codes	-S	Software licence
	1	Always 1
	1	Always 1

● Web-HMI Server Package

		Description
Model	HMIWEB	Web-HMI Server Package For Engineering and Operator Interface
Suffix Codes	-S	Software licence
	1	Always 1
	1	Always 1
	-001	Including 1 (Rich) concurrent client
	-002	Including 2 (Rich) concurrent clients
	-003	Including 3 (Rich) concurrent clients
	-004	Including 4 (Rich) concurrent clients
	-005	Including 5 (Rich) concurrent clients
	-006	Including 6 (Rich) concurrent clients
	-007	Including 7 (Rich) concurrent clients
	-008	Including 8 (Rich) concurrent clients
	-009	Including 9 (Rich) concurrent clients
	-010	Including 10 (Rich) concurrent clients
	-015	Including 15 (Rich) concurrent clients
	-020	Including 20 (Rich) concurrent clients
	-025	Including 25 (Rich) concurrent clients
	-050	Including 50 (Rich) concurrent clients
	-100	Including 100 (Rich) concurrent clients
	-250	Including 250 (Rich) concurrent clients
	-500	Including 500 (Rich) concurrent clients

Note: A full client runs on each Web-HMI Server (Engineering & Operator environment).
Note: A Web-HMI Server will only run on a Windows platform.
Note: For Web-HMI client extensions, see model codes for upgrades further down this section.

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● Visual Basic .NET API

		Description
Model	VBAPIN	Visual Basic .NET API
Suffix Codes	-S	Software licence
	1	Always 1
	1	Always 1

Note: This is a project licences.

● FAST/TOOLS User's Manual on DVD

		Description
Model	FTMANCD	FAST/TOOLS User Manual
Suffix Codes	-1	Always 1
	CCD	on DVD

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● FAST/TOOLS Users Manual

		Description
Model	FTMAN	FAST/TOOLS User Manual
Suffix Codes	-1	Always 1
Option Codes	/C4C02	AUDIT /FAST System Integrator's Manual
	/C3C00	BUS/FAST User Manual FSU-editor
	/C3C01	BUS/FAST DUR Programmer's Guide
	/R7R00	ACCESS/FAST System Integrator's Manual
	/M2M00	ALARM/FAST Programmer's Guide
	/M7M01	ALARM /FAST System Integrator Manual
	/H2H00	AUDIT/FAST Programmer's Guide
	/H7H01	AUDIT /FAST System Integrator's Manual
	/E5E01	BUS/FAST User Manual FSU-editor
	/E2E00	BUS/FAST DUR Programmer's Guide
	/B2B00	BUS/FAST GIN Programmer's Guide
	/B2B01	BUS/FAST UMH Programmer's Guide
	/E2E02	BUS/FAST FSL Programmer's Guide
	/E7E03	BUS/FAST System Integrator's Manual DUR
	/E7E04	BUS/FAST System Integrator's Manual DURSIM
	/E7E05	BUS/FAST System Integrator's Manual
	/F6F00	DATABASE/FAST DLL Language Manual
	/F6F01	DATABASE/FAST DSS Language Manual
	/F2F01	DATABASE/FAST Programmer's Guide DSS
	/F2F02	DATABASE/FAST Programmer's Guide ISF
	/F7F02	DATABASE/FAST System Integrator's Manual DSS
	/F7F01	DATABASE/FAST System Integrator's Manual ISAM
	/A3E00	DATABASE/FAST High Availability Computing User Manual
	/L2L00	EQUIPMENT/FAST Programmer's Guide
	/L7L01	EQUIPMENT/FAST System Integrator's Manual Maintenance
	/L7L02	EQUIPMENT/FAST System Integrator's Manual
	/G2G00	HISTORY/FAST Programmer's Guide
	/G7G01	HISTORY/FAST System Integrator's Manual
	/T7T00	Integration System Integrator's Manual Maintenance
	/T7T01	Integration System Integrator's Manual
	/J2J00	ITEM/FAST ITH Programmer's Guide
	/J2J01	ITEM/FAST ITM Programmer's Guide
	/J7J01	ITEM/FAST ITH System Integrator's Manual
	/J7J02	ITEM/FAST ITM System Integrator's Manual
	/N6N01	PROCESS/FAST Java Language Manual
	/N6N00	PROCESS/FAST Language Manual
	/P2P00	PROCESS/FAST Programmer's Guide
	/P7P01	PROCESS/FAST System Integrator's Manual
	/Q6Q00	REPORT/FAST Language Manual
	/Q2Q01	REPORT/FAST Programmer's Guide
	/Q7Q02	REPORT/FAST System Integrator's Manual Maintenance
	/Q7Q03	REPORT/FAST System Integrator's Manual
	/S5C03	USER/FAST User Manual
	/S7S01	USER/FAST HMI System Integrator's Manual
	/A3C00	FAST/Start Getting Started
	/C3D00	USER/FAST Trending User Manual

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● Windows RGS Package

		Description
Model	FTRGS	FAST/TOOLS Microsoft Windows RGS Package Includes: BUS/FAST DATABASE/FAST HISTORY/FAST ITEM/FAST EQUIPMENT/FAST (Vnet/IP driver) Web-HMI server inclusive one (1) Web-HMI-Client
Suffix Codes	-S	Software licence
	1	Always 1
	1	Always 1

Note: For a redundant RGS configuration twice the package must be ordered.
Note: FAST/TOOLS Support Contract (FTSUP) must be ordered with the RGS package.
Note: Web-HMI-Client is for Engineering only.

● Collaboration Function

		Description
Model	FTCDSS	Collaboration /Decision Support Solutions Function
Suffix Codes	-S	Software licence
	1	Always 1
	1	Always 1

Note: This is a project licence.

● Alarm System Performance Analysis

		Description
Model	FTASPA	Alarm System Performance Analysis
Suffix Codes	-S	Software licence
	1	Always 1
	1	Always 1

Note: ASPA can connect to one FAST/TOOLS server (model MSSVRN or RVSVRN).

● Web-HMI Server Package for Mobile

		Description
Model	HMIMOB	Web-HMI Server Package for Mobile
Suffix Codes	-S	Software licence
	1	Always 1
	1	Always 1
	-005	Including 5 mobile clients
	-010	Including 10 mobile clients
	-020	Including 20 mobile clients
	-050	Including 50 mobile clients
	-100	Including 100 mobile clients
	-250	Including 250 mobile clients
	-500	Including 500 mobile clients

Note: For web browser support see list in General Specification FAST/TOOLS.
Note: HMIMOB is an extention of Web-HMI Server Package. So HMIWEB is always needed.

● Distributed Temperature Sensor Function

		Description
Model	FTDTSX	DTSX driver and advance trending module
Suffix Codes	-S	Software licence
	1	Always 1
	1	Always 1

Note: FTDTSX can run on one FAST/TOOLS server (model RVSVRN or MSSVRN).
Note For a redundant FAST/TOOLS server configuration twice the package must be ordered.
Note: Driver supports only TCP/IP communication with YOKOGAWA DTSX200 or DTSX3000.

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● FAST/TOOLS Consultancy

		Description
Model	CONFSTN	FAST/TOOLS Consultancy
Suffix Codes	-C	Mo-Fr: 8 hours/day (08h - 17h) per hour
Option Codes	/E1	Uplift for overtime: between 17h 22h
	/E2	Uplift for overtime: between 22h - 08h
	/E3	Uplift for overtime: in weekends / holidas

Note: Prices excluded embilisation/demobilisation. All traveling hours and related costs to requested site-visits will be invoiced to the Customer.

● FAST/TOOLS Support contract

		Description
Model	FTSUP	Support contract for FAST/TOOLS licence (RVSVRN, MSSVRN & UNSVRN) Annual fee
Suffix Codes	-S	Software licence
	1	Always 1
	1	Always 1
	-RAB□□	Number of RVSVRN server licence -SA and/or -SB
	-RCD□□	Number of RVSVRN server licence -SC and/or -SD
	-REF□□	Number of RVSVRN server licence -SE and/or -SF
	-RGH□□	Number of RVSVRN server licence -SG and/or -SH
	-RJK□□	Number of RVSVRN server licence -SJ and/or -SK
	-RL0□□	Number of RVSVRN server licence -SL
	-MAB□□	Number of MSSVRN/UNSVRN server licence -SA and/or -SB
	-MCD□□	Number of MSSVRN/UNSVRN server licence -SC and/or -SD
	-MEF□□	Number of MSSVRN/UNSVRN server licence -SE and/or -SF
	-MGH□□	Number of MSSVRN/UNSVRN server licence -SG and/or -SH
	-MJK□□	Number of MSSVRN/UNSVRN server licence -SJ and/or -SK
	-MLU□□	Number of MSSVRN/UNSVRN server licence -SL and/or -SU
	-WB□□□	Enter clients licences (model HMIWEB)
	-RGS□□□	Number of RGS licence

Note: The annual support contract provides product support on the standard FAST/TOOLS product for faults/bug fixes. The support contract includes office hour telephone and e-mail support. Application support and remote support will be provided on request.
Note: All software licenses will be sold with a support contract to the end-user. This support contract will become effective as soon as the license is purchased. This also applies to upgrade licenses.
Note: Valid for FAST/TOOLS Software license only.

● Windows Server Package for Upgrade

		Description
Model	RVSVRN	FAST/TOOLS Microsoft Windows Server Package
Suffix Codes	-S	Software licence
	2	For upgrade
	1	English version
	-AB	Upgrade licence from 250 to 500 item numbers
	-BC	Upgrade licence from 500 to 1,000 item numbers
	-CD	Upgrade licence from 1,000 to 2,000 item numbers
	-DE	Upgrade licence from 2,000 to 4,000 item numbers
	-EF	Upgrade licence from 4,000 to 8,000 item numbers
	-FG	Upgrade licence from 8,000 to 16,000 item numbers
	-GH	Upgrade licence from 16,000 to 32,000 item numbers
	-HJ	Upgrade licence from 32,000 to 64,000 item numbers
	-JK	Upgrade licence from 64,000 to 128,000 item numbers
	-KL	Upgrade licence from 128,000 to 256,000 item numbers

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● Windows Server Package - Distributed for Upgrade

		Description
Model	MSSVRN	FAST/TOOLS Microsoft Windows Server Package - Distributed
Suffix Codes	-S	Software licence
	2	For upgrade
	1	English version
	-AB	Upgrade licence from 250 to 500 item numbers
	-BC	Upgrade licence from 500 to 1,000 item numbers
	-CD	Upgrade licence from 1,000 to 2,000 item numbers
	-DE	Upgrade licence from 2,000 to 4,000 item numbers
	-EF	Upgrade licence from 4,000 to 8,000 item numbers
	-FG	Upgrade licence from 8,000 to 16,000 item numbers
	-GH	Upgrade licence from 16,000 to 32,000 item numbers
	-HJ	Upgrade licence from 32,000 to 64,000 item numbers
	-JK	Upgrade licence from 64,000 to 128,000 item numbers
	-KL	Upgrade licence from 128,000 to 256,000 item numbers
	-LU	Upgrade licence form 256,000 to unlimited item numbers

● FAST/TOOLS LINUX & UNIX Server Package for Upgrade

		Description
Model	UNSVRN	FAST/TOOLS LINUX & UNIX Server Package
Suffix Codes	-S	Software licence
	2	For upgrade
	1	English version
	-AB	Upgrade licence from 250 to 500 item numbers
	-BC	Upgrade licence from 500 to 1,000 item numbers
	-CD	Upgrade licence from 1,000 to 2,000 item numbers
	-DE	Upgrade licence from 2,000 to 4,000 item numbers
	-EF	Upgrade licence from 4,000 to 8,000 item numbers
	-FG	Upgrade licence from 8,000 to 16,000 item numbers
	-GH	Upgrade licence from 16,000 to 32,000 item numbers
	-HJ	Upgrade licence from 32,000 to 64,000 item numbers
	-JK	Upgrade licence from 64,000 to 128,000 item numbers
	-KL	Upgrade licence from 128,000 to 256,000 item numbers
	-LU	Upgrade licence from 256,000 to unlimited item numbers

● USER/FAST Web-HMI Server Package for Upgrade

		Description
Model	HMIWEB	USER/FAST Web-HMI Server Package
Suffix Codes	-S	Software licence
	2	For upgrade
	1	English version
	-UP1	Upgrade licence for 1 (Rich) concurrent client
	-UP5	Upgrade licence for 5 (Rich) concurrent client

Note: Web-HMI Licence are only available in the follow range; 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20 and 25.

■ ORDERING information

Specify the model and suffix codes.

■ TRADEMARKS

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